Integrating or desintegrating welfare states?

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Publication date:
1995

Document Version
Publisher's PDF, also known as Version of record

CentER
for
Economic Research

Integrating or Desintegrating Welfare States?

A qualitative study to the consequences of economic integration on social insurance

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INTEGRATING OR DESINTEGRATING

WELFARE STATES?

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Proefschrift

ter verkrijging van de graad van doctor aan de Katholieke Universiteit Brabant, op gezag van de rector magnificus, prof. dr. L.F.W. de Klerk, in het openbaar te verdedigen ten overstaan van een door het college van dekanen aangewezen commissie in de aula van de Universiteit op donderdag 7 september 1995 om 14.15 uur

door

Arjan Marcel Lejour

geboren op 15 juni 1966 te 's Gravenhage

Promoter: Prof. dr. H.A.A. Verbon

Acknowledgements

This book is the product of four years work on the subject of "Economic Integration and the Consequences for Social Insurance Policies. The research was carried out at the Department of Economics at Tilburg University. I would like to thank the Department for giving my the opportunity of combining the completion of my thesis and my teaching duties as assistant professor. Further, I would like to thank CentER for Economic Research for the stimulating research environment, and all institutions that gave me the possibilities to attend stimulating congresses and workshops by their financial support and/or organisation of theses workshops, like the Department, the Netherlands Organisation for Scientific Research (NWO), European Economic Association, the European Science Foundation, and the Dutch Network for Quantitative Economics (NAKE).

As an econometrician with hardly any knowledge of public economics, I came accidentally in touch with the research project "Economic Integration and its Effects on Social Insurance Policies". This opened the doors of the interesting world of public economics, and in particular fiscal federalism. I would like to thank my supervisor Harrie Verbon, who formulated this research topic, for introducing me into this field and his trust in my ability of doing research on a area that was quite unfamiliar to me. Moreover, he is also the coauthor of several papers that resulted from the research project.

The criticisms and suggestions that were made during my presentations, in particular the informal macro-seminars at Tilburg University, as well as the referees of the Center Discussion Paper series and journals, contributed to this book. In particular, I want to thank Lans Bovenberg and Harry Huizinga in this respect.

Moreover, I want to thank my colleagues Eline van der Heijden, Lex Meijdam, and Martijn van de Ven and Marijn Verhoeven who created a sociable research environment and never failed in putting research and the results in perspective. Furthermore, I want to thank my relatives for supporting me doing a job whose content was not always clear to them, and Manon for her efforts in preventing me to become a workaholic.

's Hertogenbosch, 15 juli 1995

Arjan Lejour

Contents

Chapter 1

Preliminaries

1.1 Introduction

The current interest in economic integration needs little comment. At the Uruguay round in 1993 countries agreed to lower tariff rates and to create a world trade organisation that will stimulate trade and solve trade disputes. At a regional level integration goes even further. In a lot of regions countries have agreed to form free trade areas in the near or more distant future. Most advanced in this respect is the North American Free Trade Agreement (NAFTA) between Canada, Mexico, and the United States. This is not the only free trade agreement in that area. The countries around the Pacific agreed to form the Asia-Pacific Economic Cooperation forum (APEC), and in 1994 all American countries (except Cuba agreed) to form the free trade area of the Americas. As of January 1995 the Mercosur countries (Argentina, Brazil, Paraguay, and Uruguay) have even formed a custom union with common external tariffs, although many exceptions do exist.

The most advanced form of economic integration takes place in Europe. Already in 1957, the six original member states decided gradually to open their labour and commodity markets. In the eighties they also decided to integrate capital and service markets. Since 1993 a common market exists and the twelve member states have even agreed to form the Economic and Monetary Union (EMU). The European Union distinguishes itself also from the free trade agreements mentioned above in the sense that the Union has developed institutional structures that go beyond the structure of an intergovernmental organisation. The Union established an European court, the European Parliament and the European Commission. Although in most (fundamental) issues representatives of the national governments have decision power, in a lot of well-defined areas these institutions have autonomous decision power at the expense of the member states. It has even be argued that the Union will someday become a federal institution. In that case the member states would have to give up decision power. This seems already to be a problem for the introduction of one currency, and is even more difficult with respect to tax issues.

All these integration tendencies - whether they are pushed by agreements or innovations and new technologies - increase the economic interdependency between the member states. This interdependency affects the fiscal policies of the member states. Due to integration, tax bases are much more mobile: high tax rates thus reduce the size of the tax base much more heavily than they would in a closed economy. Production factors and trade are much more sensitive to small differences between countries, which is also the case for differences in fiscal policies, due to the fact that the barriers to

mobility have been eliminated. For that reason the member states decided to harmonize the levels of the value added tax to some extent. In addition, they set up a committee to investigate the differences in the corporate tax structures in the Union. However, nearly no attention has been paid to the differences in social insurance systems. Taking into account the size of the social insurance budget in the Union (26.0% of GDP in 1991), this seems peculiar.

Or are differences in social insurance systems irrelevant? Some argue that these differences are economically unimportant because these differences would primarily affect migration. However, migration flows are often low in Europe, compared to the United States and movements within countries. So, it is often concluded that differences in social insurance systems do not really matter.[1] In addition, these systems are complex and differ substantially between the member states with respect to the structure and the levels of social protection. From that perspective, it seems better not to interfere in these national affairs.

On the other hand, people fear social dumping. Labour unions often express the fear that firms will locate in countries with low social expenses, because of lower labour costs. There are indeed some cases of firms that settled in the United Kingdom instead of France because of these lower labour costs. In principle, countries could manipulate the level of social insurance taxes and thereby labour costs in order to attract foreign investment and to make home-located firms more competitive. As a result, production and employment will rise.

This thesis examines the relation between economic integration and national social insurance policy into more depth. It analyses from an economic-theoretical point of view whether countries do use the level of social insurance expenditures and contributions strategically in a world in which economies are integrated. We will analyse the welfare effects of national social insurance policies on other member states. In general, the member states pursue their own interest, and take no account of these welfare effects. Therefore these effects are called external effects, or externalities. This thesis will analyse whether these externalities exist, and whether this leads to overexpanded or too limited social insurance systems. Given some degree of interdependency between the member states, this book also investigates the consequences of further integration on these external effects.

By investigating these issues we make no claim that the argument mentioned above about the low degree of mobility in Europe is irrelevant. We also make no assertion that integration will lead to social dumping. From a qualitative point of view, we do claim,

[1] See Wildasin (1990) and Bureau & Champsaur (1992) among others.

however, that migration, capital mobility and trade are channels between countries that transmit the effects of national social insurance policies to other countries. This thesis argues that many of these external welfare effects exist. This implies that the answers to the question of whether the European Union has to take measures to prevent social dumping have to be more subtle than they are at this moment. However, this thesis does not claim that all these externalities will lead to social dumping. There exist also several external effects that exert an upward effect on the level of social insurance (see chapters 5, 6, 7). These externalities have to be studied more carefully. We also conclude that cooperation by integrating commodity and capital markets can lead to more competition in other areas, such as social insurance policy (see chapter 6). This does not imply that social insurance policies have to be coordinated. The results in chapter 7 suggest that coordination in this area can lead to more competition in other policy areas, and can reduce the positive welfare effects of coordinating social insurance policies.

This thesis provides no definite answer to the question of whether social insurance policies should be coordinated by the EU. Our attempts to answer this question were met by more and more questions still. It is, however, our aim to make explicit many arguments for and against coordination. Based on the results of the foregoing chapters, the last chapter will try to balance these arguments and to draw carefully some overall conclusions. Before this conclusion can be drawn, we will cover the chapters that contain the results of this research. This chapter will give some background information. Section 1.2 and 1.3 discuss briefly the process of economic integration in the Economic Union, and the differences in social insurance systems in the various member states. Section 1.4 gives a short overview of the literature on the external effects of decentralized decision making. This chapter ends with an outline for the rest of the book, which describes in more detail the content of the various chapters, and presents also some of the conclusions toward which we will be working.

1.2 The Economic Union and Economic Integration[2]

The Economic Union was founded as the European Economic Community under the Treaty of Rome in 1957. According to that Treaty, the countries should strive for 'an ever closer union among the people of Europe and by pooling resources to preserve and strengthen peace and history' (see El-Agraa, 1990, p. 21). At that time only six countries signed the treaty. In the seventies Denmark, the United Kingdom and Ireland joined the

[2]An impressive list of textbooks describe the integration process of the Union. We used El-Agraa (1990), Molle (1990) and Goodman (1993).

Union, and Greece, Spain and Portugal followed in the eighties. Since 1995, Austria, Finland and Sweden have also entered the Union, and further extensions can be expected in the next decade.

The Union not only extended its size, but also made a number of important steps for deepening integration, in particular in the economic area. Most of these steps were necessary to arrive at the goals of the Community that were laid down in the Treaty of Rome. In the first place, the member states agreed to strive for a common market. Second, the Community aimed to be an Economic and Monetary Union. The Treaty of Rome does not oblige the member states to reach that goal, but it has provided the initial impetus. Third, the member states strive for a political union. The Treaty is, however, vague as regards the content of the goal and the methods to be employed to arrive at that goal.

Initially, the member states made a lot of progress to arrive at the first goal. In 1968 the custom tariffs between the original six member states were eliminated and a common external tariff was established. At that time the Community moved from a free trade area to a real custom union. In the seventies the deepening of integration was frustrated by difficult negotiations with the new member states, declining economic growth, and failed attempts for more political integration. The announcement of the Commission's White paper "The completion of the Internal market" (CEC, 1985) marked the revival of further economic integration. In that paper the Commission proposed about 300 measures to complete the internal (common) market in 1992. The acceptance of the White paper is embodied in the Single European Act of 1986. The measures were necessary in order to arrive at an economic union, because capital markets and services were excluded from integration in the Treaty. In addition, many trade barriers still existed, and the White paper gave the necessary impetus to overcome these problems.

The type of barriers to market integration that the White Paper deals with can be classified in three categories: physical barriers (such as customs regulations), technical barriers (including the discrimination of foreign bids of public purchases), and fiscal frontiers (due to differences in the structure of tax systems and the tax rate levels). By removing these barriers and the encouraging emergence of new competitive incentives, the member states expected four effects (Emerson et al., 1988). First, production costs can be significantly reduced due to a better exploitation of economies of scale. Second, more competitive markets will lead to more efficiency in enterprises. Third, industries will adjust, due to a better use of comparative advantage in the internal market. Fourth, the dynamics of the internal market will stimulate a flow of innovations, new processes and products. Emerson et al. (1988) estimated the expected benefits of the acceptance of the internal market programme at 5% of GDP or more, and the creation of two million

jobs. With accompanying coordinated macroeconomic policies, the total gains could even rise an extra 2% of GDP more and could create an extra three million jobs.

Four years after the announcement of the White paper (1985) the European Commission launched its plans for the creation of an Economic and Monetary Union in three stages. The acceptance of these proposals is embodied in the Maastricht Treaty. This Treaty says that the member states that satisfy the so-called Maastricht criteria will enter the Monetary Union between 1997 and 1999. These countries will give up their own currency in return for a new eurocurrency.

A further initiative of the Union is the establishment of the European Economic Area between the member states of the EU and those member of the European Free Trade Area (EFTA), that is to say Iceland, Norway, and Liechtenstein at the moment. This agreement extends the free movement of goods, people, capital and services to the

Table 1.1 Some characteristics of the EU member states for the year 1993

country[1]	population[2]	GDP[3]	GDP per head[4]	unemployment rate[5]	social expenses[6]
EU	332.0	5466	98	10.5	26.0
B	10.1	176	109	9.4	26.7
D	5.2	116	139	10.4	29.8
F	57.7	1072	116	10.8	28.7
G	81.2	1605	123	5.6[7]	26.6
GR	10.4	63	38	9.8	20.7[8]
IR	3.6	39	69	18.4	21.3
I	57.1	847	93	11.1	24.4
L	0.4	9	136	2.6	27.5
N	15.3	264	108	8.8	32.4
P	9.4	64	43	5.0	19.4
S	39.1	408	65	21.5	21.4
UK	58.0	803	86	10.5	24.7

Source CEC (1994).

[1] The abbreviations in this column refer to the European Union, Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and the United Kingdom in that order.

[2] Total population in millions.

[3] Gross domestic product at current market prices in billions of ECU.

[4] Gross domestic product at current market prices per head of population. EU excluding the former GDR is indexed at 100.

[5] Unemployment rate as percentage of civilian labour force.

[6] Percentage of GDP, source Eurostat (1993b) for the year 1991.

[7] German data do not include the former GDR.

[8] Greece data for the year 1989.

EFTA countries (see Baldwin, 1994). A large part of the agreement is identical to the Treaty of Rome and the internal market programme. Because this book mainly deals with the effects of economic integration (such as the internal market programme), the analyses carried out are suitable for both the EU and EFTA countries.

For the purpose of this book, the agreements with respect to integration are not so important. More important is the fact whether labour, capital, goods, and services markets did really integrate from the acceptance of the Treaty of Rome in 1957 until now. Only if these markets really did integrate, did the interdependency between the member states increase, which has its effects on the efficiency of decentralized social insurance systems. Therefore we present a summary of the integration effects of various markets in the EU. First, we will discus some characteristics of the EU member states' economies, see table 1.1.

Countries vary substantially in population size, GDP, GDP per head, and social expenditures, and to a lesser extent unemployment rates. GDP in Germany is about 30% of total GDP in the EU, while that of Greece and Portugal is only 1%. More important GDP per head is about 40% of the EU average in these two countries, while it is 140% in Denmark. Thus, economies and incomes differ substantially between the member states. These differences will become more pronounced if the analysis would include the composition of GDP, structure of the economies, government budgets and the like.[3] Interesting is the correlation between GDP per head and social expenses (% of GDP). The countries with lower GDP per head have also the less extended social insurance systems.

Although the free movement of labour is an objective of the Treaty of Rome, labour mobility between EU member states has been relatively low during the last decades. The freedom to migrate did not create large migration flows compared to movements within countries. Different languages, cultures, psychological and physical costs seem to hinder migration. The stock of EU citizens living in other member states is less then 2% of the total population size, as can been seen in table 1.2. Only in small countries such as Belgium and Luxembourg is the ratio much higher, due to the residence of large European institutions there. In the seventies this ratio was higher due to the migration of Spanish, Portuguese and Italian workers to the northern member states, because of the scarcity of labour in these countries.

Table 1.2 shows not only that the stocks are low, but also that the flows are modest. In 1991 0.07% of the EU citizens moved to another country. This number becomes

[3]Many books on European integration provide statistics on these issues; see El-Agraa (1990) among others.

0.16% if the return of nationals (also from no EU countries) is included. Not only the flows are low; CEPR (1994) also concludes that the effects on policy making are low. Their conclusion is based on the study of Kirchgässner & Pommerehne (1993) to redistributive policy by the local and national government and the cantons in Switzerland. Because Switzerland is small, and people speak several languages, one could expect that the migration flows between the cantons will be substantially larger than will be the flows within the EU. According to the traditional fiscal federalism literature, cantons would limit their redistributive policy because of the fear of migration. However, this does not happen. Redistributive transfers by the cantons in Switzerland have grown substantially relative to those of the federal government. This suggests that the low migration flows have nearly no impact on policy making.

Table 1.2 Migration flows and stocks in the EU for the year 1991

country	emigrants[1]		immigrants[1]		Stocks of EU migrants (thousands)[2]	ratio of migrants to population (%)
	nationals[3]	EU migrants	nationals[3]	EU migrants		
B	13.2	12.5	13.3	24.8	554.6	5.5
D	22.2	2.8	21.4	3.7	28.4	0.6
F	--[4]	--	--	9.3	1312.2	2.3
G	84.8	96.6	262.4	127.8	1487.3	1.9
GR	--	--	11.0	3.0	61.5	0.6
IR	--	--	--	--	72.9	2.1
I	51.5	2.3	56.0	7.0	111.2	0.2
L	0.9	4.6	0.9	7.7	114.6	28.6
N	36.0	9.2	35.9	20.0	176.1	1.2
P	--	--	--	--	30.0	0.3
S	9.1	--	13.8	3.3	158.3	0.4
UK	137.0	32.0	117.0	31.0	800.5	1.4
EU	354.7	160.0	531.7	237.6	4907.6	1.5

[1] See Eurostat (1993b); numbers are in thousands for the year 1991.

[2] Population size and number of migrants as of January 1st 1992; see Eurostat (1994b).

[3] Migration of nationals also includes migration to/from non-EU countries.

[4] The quality of migration data is very low. For many countries there are no good statistics. Eurostat (1993b) is the first effort to distinguish migration flows by citizenship of EU member states. The data are probably not very accurate, but give a reasonable indication of the size of the flows.

The production factor capital seems to be much more mobile. As can be seen in table 1.3, the amount of direct foreign investments in other EU member states increased substantially in the eighties. In 1990 and 1991 the growth of direct investments diminished, which is probably due to the hampering of economic growth at that time.

Of course, not only the capital markets within the EU integrated. Also at a world-wide level capital became much more mobile. In many countries capital controls were eliminated; together with the innovation of new financial instruments and new technologies, capital flows increased enormously. However, comparing the growth of direct investments within the EU with those coming from outside the EU (extra inward), and going outside the EU (extra outward), the growth of direct investment within the EU (intra) is much higher.

Table 1.3 Growth in intra and extra direct investments

investment	annual growth rate 84-89 (%)[1]	annual growth rate 84-91 (%)[2]	total growth 84-91 (%)[2]
extra inward	35.3	19.3	344
extra outward	13.8	6.0	54
intra	51.6	32.7	724

[1] Source and definition of direct investment, Eurostat (1991).
[2] Source Eurostat (1994a).

Table 1.4 Intra direct investments in the EU for 1984 until 1991

country	Intra direct investments in the EU (billion ECU)[1]		
	outward	inward	net
B/L	-15.6	22.9	7.3
D	-4.3	0.6	-3.7
F	-39.7	24.3	-15.4
G	-34.7	21.9	-12.8
GR	-0.0	1.2	1.2
IR	-1.8	8.3	6.5
I	-12.8	12.8	0.0
N	-27.6	16.5	-11.1
P	-0.4	3.9	3.5
S	-2.9	23.8	20.9
UK	-14.2	30.2	16.0

[1] The data cumulative from 1984 until 1991, Eurostat (1994a).

Table 1.4 gives an indication of the size of direct investments for the period 1984 - 1991. It shows that on net, direct investments tend to flow to the southern member states, Spain, Portugal and Greece, as well as the United Kingdom and Ireland. These countries are the economically less developed member states; see table 1.1. The net direct investment flow to Belgium/Luxembourg is also positive. This is due to large inflows in 1990/91 that probably depend on the special status of Luxembourg in the financial world.

At the start of the European Union the member states concentrated on the integration of product markets. As can be seen from table 1.5, trade increased steadily within the EU from about 6% of GDP in 1960 until 13% in 1990, partially at the expense of trade to other countries. A much larger share of the trade volume remained inside the EU than before that time. The volume of trade to other countries also increased. If this volume is expressed as a percentage of GDP, this increase is not substantial; see table 1.5. This suggests that the measures to integration pushed up trade within the EU. The importance of trade differs substantially for the various member states. In small countries like the Netherlands, Belgium, and Ireland the values of exports and imports are about 30 to 35% of GDP, while in most other countries the export values are about 10% of GDP (CEC, 1994). Only the import values of the other small countries are substantially higher.

Table 1.5 The growth of trade within the EU in the period 1960-1990

trade[1]	1960	1960	1980	1990
intra-exports	6.0	8.9	12.3	13.5
extra-exports	8.7	7.8	9.7	8.7
intra-imports	6.0	9.0	12.1	13.5
extra-imports	9.9	8.9	12.4	9.7

[1] The data are percentages of GDP at market prices; see CEC (1994).

1.3 The Social Insurance Systems in the EU

The first modern social insurance system was introduced by Bismark at the end of the last century. Before that time redistribution from rich to poor was not institutionalized on a national level. Rather, it took mainly place at local levels, often organised by the church, and later on by the local government that managed the poorhouses. The transfers from rich to poor were motivated by a mix of self interest and some altruism (De Swaan, 1989). In the beginning of this century social insurance systems were set up in

most industrialized countries. In some countries these systems covered mainly workers, following the ideas of Bismarck. In other countries the system covered everyone according to the lines of the Beveridge Report (1942). Later on, social insurance systems were extended substantially. Redistribution became the most important category of government spending, and reached its peak in the eighties. Table 1.1 presents the social insurance expenditures as percentage of GDP.

The common factor of all social insurance systems is that they developed rapidly during this century. In general, all systems cover sickness benefits and medical expenditures, disability benefits, old-age pensions, survivor benefits, family benefits and unemployment benefits. However, the eligibility of the systems, the duration of benefits, and the levels vary substantially between the countries. Extensive comparisons of all systems are scarce in the economic literature, due to the complexity of the social insurance systems, and all different rules.[4]

Table 1.6 Relative expenditures on different types of social benefits for the year 1991

country	sickness[1]	disability	old age	survivor	family[2]	unemp.[3]	other[4]
EU	27.5	8.9	37.4	8.3	7.3	6.9	3.7
B	25.5	8.7	34.1	11.5	8.9	10.3	1.1
D	19.3	8.7	36.5	--	12.1	16.3	7.0
F	28.3	5.7	37.4	7.6	9.9	7.0	4.2
G[5]	33.1	8.6	29.8	12.0	6.9	5.9	3.7
GR[6]	10.3	11.7	56.9	11.4	1.7	1.9	6.1
IR	28.8	7.0	24.5	6.7	12.7	15.7	4.6
I	26.7	6.5	50.0	10.9	4.0	1.8	0.0
L	27.1	11.8	32.6	16.3	11.0	0.8	0.5
N	22.3	22.4	31.5	5.4	5.9	8.3	4.4
P	32.9	11.8	30.1	6.7	6.2	4.8	7.5
S[7]	28.9	7.6	30.7	9.5	1.4	18.6	2.0
UK	21.3	11.6	42.2	1.0	10.5	6.2	7.2

Source Eurostat (1993b).

[1] Sickness also includes occupational accidents and diseases.

[2] Family allowances include also maternity.

[3] Unemployment benefits also include expenses for placement, resettlement and vocational guidance.

[4] Also including housing benefits.

[5] German data do not include the former GDR.

[6] Greece data are for the year 1989.

[7] Spanish data do not add up to 100% due to errors in the source.

[4]Emerson (1988) is one of the few references for an overview of the main characteristics of the various social insurance programs in many industrialized countries (year 1985).

Due to all the different features of all sorts of benefits, the amount of money spent on the various benefits differs substantially between the member states. Table 1.6 presents the percentages of total social expenditures that are spent on the various categories in all member states. It shows that nearly two thirds of the expenditures is spent on pensions and sickness, including medical care. Some remarkable figures are the high percentage of spending on disability benefits in the Netherlands, due to the eligibility of the system, and the amount of money spent on pensions in Greece and Italy. Spending on unemployment benefits is clearly related to the unemployment ratios; see table 1.1.

All these differences suggest that harmonising the systems in the EU is extremely difficult due to all the various preferences for certain types of benefits in the EU. Although coordination or harmonisation may sometimes be the outcome of economic reasoning, the data and all the different rules suggest that this is difficult to carry out in practice.

Not only the expenditures on the various types of social insurance programs differ widely in the member states, but also the way in which these expenditures are financed; see table 1.7. In nearly all countries most of these expenditures are paid by employers and employees through specific taxes (social insurance contributions). In general, the employers pay a larger fraction of these expenditures. However, this conclusion must be

Table 1.7 Relative Social insurance contributions per agent type in 1991

country	employers	protected persons	government	others
EU	41.1	23.8	28.2	6.9
B	45.3	26.7	24.8	3.2
D	7.3	5.0	81.1	6.7
F	51.8	28.4	17.6	2.3
G[1]	40.9	24.5	24.9	3.7
GR[2]	49.3	24.5	19.6	6.7
IR	24.2	15.0	59.7	1.1
I	51.4	15.7	29.9	3.0
L	31.6	22.2	38.5	7.7
N	19.9	40.2	24.1	15.8
P	43.6	23.3	28.3	4.9
S	53.9	17.7	26.1	2.4
UK	27.0	15.5	37.7	19.7

Source Eurostat (1993b).

[1] German data does not include the former GDR.

[2] Greece data are for the year 1989.

drawn with care. The tax reform in the Netherlands in 1990 caused a 'cosmetic' shift from employer-based taxes to employee-based taxes, but due to the extra allowances that employers have to pay to employees to neutralize the shift in taxes, these taxes are in fact still paid by the employers. A substantial part of the social insurance budget is also paid directly by the government. These expenditures are paid from general tax revenues, which are for the larger part financed by employers, workers and consumers (income taxes and the VAT). In Denmark the social insurance expenditures are financed by a value added tax.

The differences in the social insurance systems, thus, vary substantially. However, the member states did not make any effort to integrate the social insurance systems. The Union has only developed a complex system of rules for the maintenance of benefits because the differences in systems could hamper workers mobility by the eligibility to the system in the migration country, and by the loss of certain rights that have been built up during working life in the home country. Although the EU did not develop a common social insurance policy, a common social policy was already an issue in the Treaty of Rome. One of the last achievements in this area is the acceptance of the Social Chapter in the Maastricht Treaty by all member states except the United Kingdom. The Social Chapter includes many issues such as equal pay for men and women, safety at work, health protection, and youth unemployment, but does not include specific rules that deal with social insurance, in particular the level of social insurance.[5]

1.4 Decentralized Fiscal Policies and Economic Interdependency

As mentioned in section 1.1, the relevance of the research subject is based on the relation between decentralized fiscal policies and the economic interdependency of the countries that pursue these policies. Just because fiscal policy affects trade and the flow of production factors, fiscal decisions affect production, employment and welfare in other countries, if countries take no account of the effects of their policy decisions on other countries. This section reviews the literature that analyses the external welfare effects with respect to the mobility of labour, capital and trade in order to explain these externalities.

These externalities are a major object of study in the fiscal federalism literature. Traditionally, this literature deals with the economics of multilevel or federalist systems of government. The central question is the assignment of the right task to the right level

[5]El-Agraa (1990) and Goodman (1993) discuss in more detail the history of social policy in the EU and its scope.

of government in terms of efficiency and equity; see Oates (1972). Related issues include the motivation for adopting a federal structure, efficiency properties of migration, and the role for interregional transfers and their most desirable forms in a federal structure.[6]

Until the last decade fiscal federalism focused on issues in existing federal constitutions, such as the United States, Canada, Australia and Germany. With the increase of trade in goods and services, and the increase in mobility of production factors, especially capital, attention has been drawn to the effects of national fiscal policies on other countries in the last decade. These effects are comparable to those in federal states. However, there is no federal government that could correct the externalities. National constituencies can correct these effects only by voluntary coordination of their policies. This is also the case for the EU. The important decisions are made by the Council of national (prime) Ministers, while the European Commission only initiates policy; see El-Agraa (1990) and Molle (1990). In addition, The EU budget is still about 1.3% of GDP, and it is not expected that it will rise substantially in terms of GDP during the next decade. Based on the budget history in the EU and the near future, Bureau & Champsaur (1992) conclude, therefore, that the EU will not develop to a fiscal federalist constitution. Second, the stress on subsidiarity will not admit a shift in tax authority from the member states to the EU in the foreseeable future; see also Bureau & Champsaur. For that reason we will concentrate on the source and nature of the various externalities when there is labour mobility, capital mobility or trade (in that order), and discuss only briefly the solutions to the external effects of decision making. For each of these three transmission channels, only a few references are used. For a broad overview of the literature, see Wildasin (1986, 1987). Gordon (1983) discusses the externalities of the fiscal federalism literature in a static framework for the open economy.

With respect to labour mobility, it is often argued that individual migration in a decentralized federal system may result in inefficient levels of public provision. Sometimes, it is concluded, however, that decentralized redistributive policies and labour mobility may be efficient if there are enough regions (Tiebout, 1956), or if citizens' welfare depends on the welfare of the local poor (Pauly, 1973).

Given that regions provide public goods with no spillovers, that these goods are paid by taxes levied on residents, that there is perfect mobility of labour, as well as economies of scale in the provision of public goods, there will be a tendency for settling the whole population in one region. Two effects offset this tendency. The first one is that real wages in such areas would decrease, or there is a fixed factor in production, such as

[6]See Oates (1972), Brown & Jackson (1990), and Boadway & Wildasin (1987) for an overview.

land. Assuming constant returns to scale in production, wages rates will fall, and housing prices will rise in the immigration country. As a consequence, migration will be less attractive. The second offsetting effect is congestion effects due to the impurity of public goods. In our labour mobility model in chapter 4, the first offsetting effect is always incorporated, while the congestion effect on the public good depends on the characteristics of the potential migrants.

Decentralised decision making on public goods can lead to two types of externalities. The oldest one is the migration externality. This externality arises because migrants take only their private benefit of migration into account, and not the social benefit. As a result, the population is not optimally distributed over the whole federation. This issue is studied in greater detail by Boadway & Flatters (1982). More important here is the externality on the tax base and the congestion effects in other countries. The standard result is that countries spend an inefficiently small amount of money on redistribution in order not to attract poor people and to attract rich people who have to be taxed to finance these expenditures. However, countries do not take into account the effects of their policies on other countries that they have to care for more poor people, while the number of rich people is reduced. Their policy affects the tax base in other countries. Because the migration flow is affected, and thereby the number of residents in other countries, also the congestion effects on the labour and housing market in the other countries change.

Brown & Oates (1987) developed a formal two-country model in which the poor are able to migrate. Based on their model they conclude that there is reason to believe that decentralized redistributive policies lead to inefficiently low transfer payments. The inefficiency is caused by the change in congestion effects in the welfare system of the other country. If the migration country set low transfers payments, fewer poor will migrate from the home country, such that the welfare system in the home country is more congested due to a less favourable ratio of poor to rich people.

The model of Wildasin (1991) features also congestion effects on the labour market because wages are endogenous. There are thus externalities. Because only the income of the rich - the production value minus the labour costs - is taken as an indicator for national welfare, these externalities work in opposite directions. Low transfer payments in the migration country imply more poor workers in other countries. There is thus more need for transfers in the countries that are financed by the rich, but the return on labour is also lower. That is advantageous for the rich. On net, the externality on the welfare system is dominant. Redistributive transfers are thus inefficiently low.

The underprovision of the public good (or redistributive transfers) is also a result that often comes up in models with capital mobility. Wilson (1986) and Zodrow & Miesz-

kowski (1986), among others, have argued that property taxes set by regions lead to inefficiently low levels of public spending if capital is mobile. The property tax appears to be highly distortionary at the local level. Wildasin (1989) explains well the source and nature of this efficiency loss. Assume that the capital market is in equilibrium in the federation, the after-tax returns on capital are thus equal in each region. An increase in the tax rate of one region will cause a capital outflow from that area until the after-tax returns are equalised. In deciding on the tax increase, the region compares the increase in the excess burden and in the tax revenue with the benefits of extra public spending. Given that the outflow of capital has no effect on its price, the federation benefits from the outflow of capital from that region by the increase in tax revenue and consequently extra public spending. However, the region takes no account of this positive effect on the federation. Thus, the private benefit of extra public spending of the region will be smaller than will be the social benefit. The region takes no account of the positive external benefit of the capital outflow on the other regions.

Because all regions act in this way there will be an underprovision on public goods. From a social point of view all regions fear an outflow of capital. Therefore the property tax rates will be too low. In the literature this is called tax competition. The regions compete with each other, using the tax rate as an instrument to hold a certain stock of capital in their country. Wilson (1986) defines it as the situation in which a federal government could raise utility in each jurisdiction by requiring all jurisdictions to increase their public goods (or tax rates) by identical small amounts. Oates (1972), Wildasin (1986), Wilson (1986) and Zodrow & Mieszkowski (1986) conclude that tax competition leads to an underprovision of the public good. In these articles the tax instrument is a property tax or a capital income tax.

However, this result does not always prevail. Tax competition could also lead to an overprovision of the public good. Oates & Schwab (1988) present a model in which the preference for a high quality of the environment could induce regions to set high property tax rates to decrease investment in their region. Wildasin (1988) also makes an explicit distinction between tax competition and the underprovision of public goods. In addition, wage taxes could also be used as competing instruments. Bucovetsky & Wilson (1991) show in their model of tax competition that regions use a lump-sum tax on wage income as an instrument to attract the mobile factor capital. This is possible because the worldwide capital market is connected with the regional labour markets. In particular, a low income tax stimulates labour supply. As a consequence, wages are pushed down and employment is increased; the marginal productivity of capital thus rises. This rise, in turn, stimulates the inflow of capital.

Arnott & Grieson (1981) have been one of the first to extend the theory of optimal taxation from the closed economy to the open economy with trade. In their two-country model residents and non-residents by goods. These goods have an excise tax (destination). In the closed economy (i.e. there are no non-residents) this tax would be zero, because tax revenues are only used for redistribution, and there is no heterogeneity in the population. However, a part of the goods is bought by non-residents. It is, then, interesting to tax these goods, such that non-residents pay these taxes. Residents also pay these taxes, because it is not possible to discriminate between residents and non-residents. On net, the residents are subsidized by the non-residents. The level of the tax rate is determined by the proportion of the goods that are bought by non-residents. As a result, the tax rate is inefficiently high. Also if there are producer taxes instead of an excise tax, these taxes would be too high, because a proportion of the goods is exported. So, non-residents indirectly pay taxes. The government strives for a terms-of-trade advantage. It is, in fact, tax exporting. However, if the world price of the good is given, a tax increase does not raise the price. Then, there are no terms-of-trade effects. This result suggests that the importance of the terms-of-trade externality depends on the relative size of the country.

This externality also appears in Mintz & Tulkens (1986). They developed a two-region model in which governments levy an origin-based tax on tradeable commodities. They call this the private consumption effect: governments take no account of the effect of a change in taxes on the prices that non-residents face. There is also a second externality in the model: the effect on the tax base and public-good level in the other country. Mintz & Tulkens prove that if the regions coordinate their fiscal policies, taxes are never reduced in both countries compared to the situation in which they do not cooperate. In the benchmark case, tax competition will lead to an underprovision of the public good.

Wildasin (1993) develops a model with mobile capital and intra-industry trade. One good produced by a country serves as an intermediate input for the production of a good in the other country. In addition, there is a second good produced in each country. Due to this structure, the capital tax affects intermediate output and generates terms-of-trade effects. These effects are negative for the other country, but can be compensated by an increase in capital in that country, due to the high capital tax. Also here the two externalities work in opposite directions. Wildasin (1993) cannot characterise the Nash equilibrium, but he shows that the terms-of-trade externality dominates with the help of comparative statics at some exogenous tax rate levels. The capital tax is, thus, too high from a social point of view.

In principle, regions could negotiate with each other to correct these externalities. However, most solutions to the externality problems assume that there is a federal government which could correct them. In particular, if there are many regions, negotiations may be impossible. In that case a federal government level may be necessary. In federations with fewer countries, like the EU, it is possible that the countries negotiate to internalize the externalities. This can be stimulated with bilateral transfers or Pigouvian subsidies. The Pigouvian subsidy should equal the externality at the margin. The effect of a change in the tax rate on the externality has to be equal to the change in the grant. A second option is that the countries commit themselves to certain policy rules, such as limiting the range of possible tax rates and the like. A disadvantage of this approach is that such rules induce some convergence of the tax rate levels, while that is not necessarily the Pareto efficient outcome for an economic union consisting of member states that differ substantially from each other. Because the EU has no power to implement these kind of rules, these rules must be voluntary arranged. A consequence of this approach is that these arrangements must be beneficial to all member states.

Based on the literature summarised in this section, we define tax competition as the situation in which the tax instrument is not set on a level that would prevail if the countries would take the externalities accruing to other countries into account. That level could be higher or lower than the optimal level. The optimal level would be the outcome of voluntary coordination of decision making by the countries. By the term coordination we mean to imply the situation in which countries decide autonomously on the level of social insurance, but in a mutual action with the other members of the union set the level of their tax rates such that the reciprocal external effects are effectively taken into account.

1.5 Outline

Chapter 2 introduces and motivates the main characteristics and assumptions of the models that are used throughout the book. Section 2.2 presents the positive economic theories that explain redistribution. Based on some of these theories, the social insurance model is introduced in section 2.3. In this model, social insurance is based on the idea that risk-averse citizens want to insure themselves against the risk of losing their labour income, and that risk-averse individuals have the political power to enforce redistribution. Because social insurance contributions affect economic efficiency negatively, the level of insurance is a trade-off between insurance and economic efficiency. Economic integration, characterised by migration, capital mobility or trade, affects this trade-off

and thereby the desired level of social insurance. In addition, this chapter introduces the tools needed to analyse tax competition.

Chapter 3 through 7 analyse the effects of European integration on the social insurance systems of the member states. All chapters use two-country models to analyse the differences between decentralized and coordinated social insurance policies in order to determine whether social insurance tax rates are inefficiently low or high. In addition, comparative static exercises are carried out to examine the consequences of further integration on the decentralized tax policies and the externalities.

Chapter 3 focuses on the mobility of 'high-risk' and 'low-risk' individuals, where the risk refers to the probability of being non-employed. Migration occurs if expected utility in the migration country is higher than it is in the home country (corrected for migration costs). Given that the government represents the interests of high- and low-risk individuals, migration of high-risk workers exerts a downward pressure on the social insurance levels if these policies are not coordinated. Governments try, by lowering the level of social insurance, to scare off high-risk workers because they are costly for the social insurance systems and cause congestion costs on the labour market. The effects of mobile low-risk workers are not clear. This migration flow is seen as a cost by low-risk workers, but not necessarily by high-risk workers because of their positive contributions to the social insurance system. If the latter group is politically not dominant, governments will raise social insurance tax rates to scare off low-risk workers. If low-risk individuals correspond to the higher educated (who are much more mobile than the lower educated), this result suggests that decentralized social insurance policies can lead to inefficiently high levels of social insurance.

Chapter 4 concentrates on the effects of capital mobility. Capital owners invest abroad if the return on capital is higher abroad than it is at home (corrected for extra investment costs abroad). Social insurance is financed by worker-based taxes that can be partly shifted to employers due to the distortions on the labour market. On net, there is thus redistribution from capital owners to workers - whether they are employed or not. The existence of a social insurance system affects then the level of employment and, through adaption of the capital-labour ratio, the rate of return on capital. The government represents the interests of the homogenous workers and capital owners. Workers prefer inefficiently low tax rates to attract foreign capital, which raises employment. Capital owners prefer inefficiently high tax rates to make inward foreign investment less attractive, because this lowers the return on capital. The model shows that the preferences of workers dominate. The tax rates are, thus, inefficiently low if policies are not coordinated. Capital mobility leads to 'social dumping'. In addition, we will examine the effect of ongoing integration. If the capital importing countries have less developed social insurance systems than do the capital exporting countries, it follows that increas-

ing capital mobility will lead a divergence of social insurance systems in the Economic Union (if the degree of risk aversion is sufficiently large).

The effects of trade are covered in chapters 5 and 6. Both chapters assume imperfect competition. The consumer good markets are integrated, but full integration is impossible due to the existence of trade barriers consisting of tariffs and other nontariff barriers. The tariff barriers are exogenous in chapter 5, but endogenous in the subsequent chapter. Social insurance contributions in both countries raise labour costs of firms. Countries can use their social insurance policy strategically to achieve terms-of-trade advantages. This is possible, because prices are set by firms. On the other hand, countries have the tendency to lower tax rates in order to make their firms more competitive. The net effect of these two terms is not always clear. In the short term if there is no entry and exit of firms, there is overprovision of social insurance. With free entry and exit, however, there can be underprovision of social insurance. Lower trade barriers exert also a downward pressure on the social insurance budget if there is free entry and exit.

Chapter 6 differs from the preceding chapter in the sense that tariff policy is endogenous. The chapter concentrates on the question of whether cooperation with respect to tariff policy will lead to extra policy competition, using the social insurance tax rate as instrument. Therefore a measure for the degree of tax competition is proposed. The chapter shows that redistributive tax policy can often be used as an imperfect substitute for trade policy, if trade policy is restricted due to international agreements, such as the internal market programme in the EU. This can imply that the welfare benefits of an agreement on tariff policies are reduced by changes in redistributive policies. Given that there is overprovision of social insurance, further market integration diminishes tax competition. However, if there is already underprovision of social insurance, market integration will increase tax competition, using the redistributive tax rate as policy instrument.

Chapter 7 extends the capital mobility model with respect to time. It combines a simplified version of the static model in chapter 4 with an endogenous growth model. The government levies capital income taxes to finance redistributive transfers to workers and to invest in order to overcome the positive production externality. The model shows that low noncoordinated tax rates do not always have a negative welfare effect on the other country, as low tax rates do stimulate economic growth at home and abroad. The under- or overprovision of redistributive transfers and government investment is a trade-off between the external effect on the tax base and labour income abroad and foreign economic growth. This chapter also shows that only coordination of redistributive policies - while investment policy is still not coordinated - does not necessarily lower the external welfare effects, because it increases the negative externalities of decentra-

lized public investment policies. Furthermore, increasing capital mobility seems to stimulate the inefficient use of both policy instruments whether both policies are not coordinated or only investment policy is not coordinated.

Chapter 8 summarizes the main results of this research. It tries to balance the arguments that lead to an under- or overprovision of social insurance, and discusses the benefits of coordination. In addition, it evaluates the results of increasing integration on the labour, capital and consumer-good markets. Based on these results, we will provide some overall conclusions.

Chapter 2

The Basic Model

2.1 Introduction

This chapter presents and motivates the main characteristics and assumptions of the models that are used throughout the book. Therefore we develop a basic model that contains the main ingredients of these models. The particular modifications of the basic model are of course related to the subjects of the relevant chapters. Although the basic model does not contain all characteristics of the models used further on, it is a good representation of the main common elements.

Before discussing the model, section 2.2 provides an overview of the main economic theories that explain redistribution. It concentrates on positive explanations of social insurance systems within countries. Based on some of these theories, a social insurance model is introduced in section 2.3. That section discusses the main elements of a model that describes social insurance policy for an autarkic country. In this model the existence of social insurance systems is based on the ideas that, first, risk-averse workers want to insure themselves against the risk of losing their labour income, and, second, workers have the political power to enforce redistribution. Section 2.4 underpins the decision-making function with respect to social insurance policy that is used in this book. Sections 2.5 and 2.6 extend the basic model to the two-country case. They explain and discuss the methods that are used and the assumptions related to the international characteristics of the model. Section 2.5 concentrates mainly on the Nash equilibrium in the two-country case, and its comparison with autarky. Section 2.6 deals with the coordination of decentralized social insurance policies, and the effects of further integration.

2.2 Public Choice and Redistribution

Various theories attempt to explain the existence of redistributive transfers and their size. Empirical testing of these theories seems to suggest that most of them are relevant, but that they all fail to explain the size of redistributive transfers. This section discusses the main theories. A complete overview is not possible. For the empirical literature, including the work on poverty and the economic effects of redistribution, see Atkinson's overview (1987). Here we stick to the most important theoretical explanations of the existence and size of social insurance systems.

In the discussion of these theories a distinction must be made between constitutional and post constitutional theories. This distinction is due to Buchanan (1975). Post

constitutional theories assume the existence of enforceable property rights that are necessary for the effective functioning of markets. In the constitutional theories these property rights do not exist. Below, we will briefly discuss the constitutional theories of Buchanan (1975) and Rawls (1972).

Buchanan (1975) argues that in the Hobbesian state of nature the natural distribution of wealth is unstable. Poor people will try and succeed in obtaining some of the wealth of the rich at all possible (violent) means. The costs for the rich to defend themselves against these actions of the poor will exceed those of the redistributive transfers to the poor that are necessary to reduce the incentives of the poor for these actions. In this theory redistribution is motivated by self protection of the rich. This process will diminish natural inequalities.

Rawls (1972) takes another route. He introduces the veil of ignorance to neutralize egoistic preferences. Behind this veil everybody in the so-called original state knows the distribution of outcomes (in the economic process), but nobody knows ex ante which position he/she will have in that distribution. The distribution of outcomes is for everybody the same. In an economic system with exogenous endowments, risk-averse individuals will choose unanimously for a redistributive system that equals incomes. This follows, because marginal utility of every individual with respect to income has to be the same. In a production economy in which endowments are endogenous complete equality is not desirable, because of the disincentive effects on effort. However, also here the redistributive system will diminish income inequality.

Both theories are similar with respect to the assumptions of self interest and risk aversion that are used implicitly or explicitly. The transfers in the Hobbesian state of nature are a means used to reduce the risk of being attacked. The main difference in both theories is the introduction of the veil of ignorance by Rawls. This veil neutralizes egoistic preferences inherent in the original state. This veil introduces the ethical notion that everyone is equal, ex ante.

The underlying motives for redistribution, such as self interest and risk aversion, are also important in the theories that assume that enforceable property rights do exist. Rodgers (1974) classifies the post constitutional theories in three categories: the narrow self-interest model, the interdependent utility model and the social insurance model. This classification is also followed below. Mueller (1989) gives a more recent overview of these theories.

The narrow self-interest model assumes that people are purely self interested. Redistributive transfers take place because individuals or interest groups have the political power to enforce them, in spite of the opposite political power of those who

have to finance these transfers. Meltzer & Richard (1981), Peltzman (1980), and Becker (1983) are the classical papers in this field.

In Meltzer & Richard (1981) the median voter (the individual with median income) decides on the level of the redistributive transfer. Everybody earns a different income, and the median voter earns less than average income. The tax structure is such that taxes are proportionally levied on income, and transfers are equally distributed in a lump-sum fashion. Then, the median voter will select a positive redistributive tax rate, because it raises his income. By this mechanism the model predicts redistribution from rich to poor. Redistribution is limited by the disincentive effects of high tax rates on labour supply. The authors explain the increase in redistribution by the extended voting rights in this century to the less wealthy people, and by the increase in inequality, that is to say the increased difference between the median and average income. The model explains neither the extension of voting rights, nor the redistribution from poor to rich.

Peltzman (1980) and Becker (1983) explain redistribution in interest group models.[1] In the Peltzman model political candidates compete for votes by redistributing income towards those groups of voters that join the coalition of supporters. So, the coalition of supporters consists of several groups of voters. The more equal the income distribution within these groups, the more bargaining strength the groups have towards the political candidates. As a result, the more equal the income distribution is the more redistribution is needed to get a large coalition of support. Peltzman claims that the spread of education was an important factor for the increasing equality of pre-transfer incomes. Meltzer & Richard (1981) and Peltzman (1980) present empirical material that supports their theories. However, Peltzman's hypothesis depends on increasing equality (within groups) to drive the growth of redistribution this century, while Meltzer & Richard's hypothesis rests on increasing inequality.

Becker (1983) models the competition between pressure groups for political influence. Because taxes, subsidies and the like are instruments to favour interest groups, competition between interest groups determines the levels of taxes and subsidies. The political influence depends on the time and the money that is invested by the interest groups, and their productivity to transform these inputs in political influence. Every interest group maximises their utility such that the marginal gain of an increase in subsidies or reduced taxes is equal to the marginal costs of time and money to apply additional pressure. The model predicts that small groups more easily get subsidies than do large groups. Although relatively successful interest groups tend to be small, they are also more efficient in producing political power by controlling the free-rider problem in the interest

[1]Coughlin (1986) uses a probabilistic voting model to prove that, if only redistribution issues are at stake, political equilibria that underlie the policy function exist.

group, and achieve economies of scale in exerting political influence. Becker's model provides an underpinning of the relative influence of interest groups in policy decisions. The function to produce political power is, however, not motivated. Mueller & Murrell (1986) have found evidence that the number of organized interest groups affects positively the size of the government.

The second class of models are the interdependent utility models. These models assume that the more wealthy individuals derive utility from giving a transfer to the poor to guarantee the poor a certain income or a certain amount of a specific consumption good. In some models the act of transferring a subsidy to the poor has intrinsic value for the rich, but in most models the act of giving is instrumental, and the benefit to the poor is the intrinsic value.

A classic paper on this subject is Hochman & Rodgers (1969). They show that redistribution can be Pareto optimal in a model in which the rich are altruistic towards the poor, and the poor have negligible voting power. Government intervention is necessary to coordinate redistribution and to overcome the free-rider problem. Every rich individual prefers a higher income for the poor, but his own effort has a negligible effect on the situation of the poor in general. However, a collective transfer of all the rich can substantially improve the living conditions of the poor. Altruism from the rich is not necessarily based on unselfishness, but can also be based on selfishness. Redistribution can be motivated by considerations such as the dislike of decayed areas near their own neighbourhoods, improving the living conditions of the poor in order to reduce the probability that social unrest and criminality will occur, and inciting the poor to stay in the area, which is beneficial in more prosperous times, when more labour is needed.[2] Note that some of these arguments are closely related to Buchanan's motivation for the existence of redistribution. The importance of altruism in explaining income redistribution is heavily disputed. Although it is in general accepted that altruism is one of the driving forces of income redistribution, it is argued that altruism cannot explain all income redistribution.

The third class of models interpret redistribution as social insurance. Because there is considerable income uncertainty in life, rational risk-averse individuals want to smooth their income. They are prepared to pay an insurance premium on the condition that they receive a transfer in unfavourable times, when their income may be low or negligible. Because of moral hazard, adverse selection, and imperfect capital markets, so that people cannot borrow money at the start of their life to pay all the premiums, private insurers

[2]For a detailed underpinning of these arguments, see De Swaan (1989).

are reluctant to provide income insurance. Therefore rational individuals may vote for social insurance programmes. Such programmes are of course implemented only if most people want the insurance. The adverse selection problem is solved, because the minority of the people that has no interest in the programme are obliged to contribute. Moral hazard can, however, still occur if the government organises social insurance.

History seems to confirm a positive relationship between uncertainty and the introduction of redistributive programmes. Mueller (1989) states that most social insurance programmes in the United States were initiated during the time of the Great Depression. Dryzek & Goodin (1986) argue that the British became aware of life uncertainty during World War II, and that was a motivation to vote for the expansion of social insurance programmes. In the Beveridge Report (1942), the extension of social insurance programmes and the introduction of family allowances was motivated by smoothing income "*between times of earning and non-earning and between times of heavy responsibilities and light or no responsibilities*" (Varian, 1980). In the opinion of Varian, decisions on redistribution involve more than merely equity and efficiency. Above all, the social insurance effect from reducing the variance of income uncertainty is important.

Varians' theory on redistribution has close links to Rawls' theory. In both theories redistribution is motivated by risk aversion and uncertainty. Both theories differ in the sense that the veil of ignorance neutralizes egoistic preferences. This implies that everybody has ex ante a similar starting point. This is not the case in Varians' theory. Although everybody faces ex ante uncertainty, each also has a different starting position. As a consequence, different opinions exist about the existence and the size of the system. These differences in opinion are ruled out in Rawls' theory.

2.3 The Basic Model in the Autarky Case

The main aim of this chapter is to introduce a model that can be used to analyse the consequences of economic integration on national social insurance policies. It is not the purpose to explain the existence of social insurance in itself or the actual size of the systems in the industrialized countries. In this respect, for the purpose at hand it is not so important whether social insurance is explained by insurance, self-interest or altruism. We prefer to use post-constitutional theories of redistribution, because, first, constitutional theories pay most attention to the reasons for existence of social insurance systems (rather than its development) and second, this existence is explained in a surrounding without well-defined property rights, while in this research the relation between the system and the market economy that is based on property rights is of importance.

The choice remains between three post-constitutional theories of redistribution. Two of them are combined: the self-interest and risk-aversion model. This does not imply that altruism plays no role in explaining inter- and intragenerational redistribution. The introduction of altruism in the model has, moreover, little value added in investigating the implications of economic integration.[3] The choice for the risk-aversion or insurance model is motivated by the fact that a lot of income-redistribution programmes are initiated to cope with income uncertainty, and the fact that the largest part of these programmes consists of explicit insurance programmes. In his overview of the welfare state, Barr (1992) argues that insurance is one of the most important functions of the welfare state - in particular against the risk of income loss due to unemployment, sickness or old age. This is supported by empirical evidence on the fraction of insurance programmes of all income redistributive programmes.

It must be noted that social insurance is not an actuarially fair mechanism. In general, the programmes insure average risks. This implies that there is implicit redistribution from those who pay more social insurance premiums than would be actuarially fair (the low-risk individuals) to those who pay less premiums than actuarially fair (the high-risk individuals). As a result, people have different interests in the level of social insurance programmes. This is captured by introducing interest groups in the model. So, the narrow self-interest theory is added to the one that explains redistribution by social insurance.

We distinguish in our social insurance model two different states: one in which people work and receive labour income, and a second one in which they are jobless and receive no labour income. People want to maximise their expected utility over these two states. Varian (1980), Wright (1986), and Verbon (1990) among others, model social insurance and unemployment insurance in more or less similar ways. Varian distinguishes the states in which an individual has luck and receives a higher income, and a state in which he has no luck and obtains less income. Wright and Verbon explicitly assume that in one state people have a job and receive labour income, and in another state they are jobless, and need income from other sources to survive. In both models people are prepared to pay a tax contribution in times they are employed or earn a higher income, expecting to receive a benefit from the government when they have no job or less labour income.

[3]Chapter 3 shows that the effects of labour mobility in models based on altruism and risk-aversion are qualitatively similar.

As a first approach, we will assume that individuals are homogenous; the social insurance systems thus have ex ante no redistributive characteristics. Then, the basic model has the following structure.

$$\max \quad D = HE(U_l) = (1-\lambda)HU((1-\tau)w) + \lambda HU(\eta w) \tag{2.1}$$

Policymakers maximise the expected utility, $E(U_l)$, of all, H, workers. $1-\lambda$ represents the probability of having a job and receiving labour income, w. w and λ are assumed to be exogenous at the moment. τ is the social insurance tax rate levied on gross labour income, and ηw represents benefit income. $U(\ )$ represents the utility of real income whether or not one is employed. The utility function is twice continuously differentiable, increasing, strictly concave, and it satisfies the Inada conditions. This implies that the utility of zero income is zero, its marginal utility is infinite, and that marginal utility of infinite positive income is zero. These conditions also imply that workers are risk averse.

Most social insurance systems are pay-as-you-go systems, so that total tax contributions of the earners equal the expenditures to beneficiaries. It is assumed throughout the whole book that there are no administrative costs in the system.[4] Then, the budget equation reads

$$\tau w(1-\lambda)H = \eta w \lambda H \tag{2.2}$$

For simplicity this equation will be rewritten as

$$\eta w = \tau \gamma \qquad \Rightarrow \qquad \gamma = \frac{(1-\lambda)H}{\lambda H} \tag{2.3}$$

γ is the ratio of employed to non-employed. Its inverse, $\frac{1}{\gamma}$, can be interpreted as the price of the social insurance system. The lower the ratio of employed to non-employed, the lower will be the benefit (given a fixed tax rate). Given the fixed tax rate, the price of a 'reasonable' benefit is increased. One has to pay higher taxes to guarantee a 'reasonable' benefit level.

The social insurance tax rate and the benefit are the policy variables. The budget restriction relates both variables to each other. If equation (2.3) is substituted in the decision-making function or policy function, equation (2.1), welfare depends only on the tax rate. Maximising this function gives[5]

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[4]In the EU the administrative costs, and other expenditures are on average less than 5% of the total expenditures on social benefits, see Eurostat (1993b).

[5]The second-order condition of this maximisation problem is satisfied.

$$1-\tau = \tau\gamma \qquad \Rightarrow \qquad \tau = \frac{1}{1+\gamma} = \lambda \tag{2.4}$$

In this model the optimal tax rate equals the probability of being non-employed. So, the lower the rate of employment, the higher the tax rate. In this expected utility model, people want to equalize their income in both states. In the optimum there is full insurance; the benefit income equals net-wage income. Because less employment raises the price of the system, workers are prepared to pay more taxes.

The model described above is the most simple framework to model insurance. It is not very useful in explaining redistribution. First, everybody is assumed to be homogenous. Second, all possible links between the social insurance system and the market economy are ignored here by assuming fixed wages and fixed employment rates. Thus far, the model takes no account of the distortionary effects of taxes on labour supply decisions, nor of the effects on labour demand and wages. In reality, full insurance would probably lead to a massive decrease in labour supply, because no incentive to work exists if one obtains the same income without any labour effort. Taking leisure into account in the utility function makes the situation even worse. Given equal monetary income in both situations, the utility of employed individuals would be lower than utility of those who are not employed.

Some of the economic elements mentioned above have to be introduced in the model to get a useful framework for studying the interaction between the market economy and social insurance policies. For that reason, assume that the probability of being non-employed depends on the tax rate. Higher tax rates cause more economic distortions, so increasing the probability of being non-employed. Therefore $\lambda = \lambda(\tau)$, and $\lambda_\tau \equiv \frac{\partial\lambda}{\partial\tau} > 0$. Note that this is just one way of introducing economic distortions in the model. We could also have chosen to relate the wages to the tax rate.

Introduction of the relation $\lambda = \lambda(\tau)$ in the model means that social insurance policies affect economic activity. Then, the question becomes whether the government/-policymakers take into account the effects on economic activity due to the tax policy in their decision-making processes or take the level of economic activity as given. The latter situation holds when the private sector and the government make their decisions simultaneously, and assume the decisions of the other parties as given. Then, there exists a Nash equilibrium between the government and the private sector.[6]

[6]See among others, Drissen & van Winden (1991).

In the first situation the government takes into account the reaction of the private sector. After the government's fiscal policy is announced, the private sector makes its decisions. Formally, the government is a Stackelberg leader towards the private sector. This relation between the government and the private sector is most often used in the literature. It contains the idea that the economy consists of one large government and many small atomistic agents in which decisions of the government can influence the agents' utility quite heavily, while decisions of individual agents have nearly no effect on the government. Using their economic models (such as the models of the Central Planning Bureau in the Netherlands), the government can reasonably forecast the reaction of the private sector to changes in fiscal policy.

However, this way of modelling can contain a time-consistency problem (see Fischer, 1980). After private actions are taken based on the announced fiscal policy, the government has the incentive to deviate from this policy, which could harm the private sector substantially. However, most models are static in this book, and it is assumed that the announcement of the policy, private sector behaviour, and tax collection take place at the same time. In chapter 7 in which a dynamic model is presented, the time-consistency problem is ignored by assuming that the government does not deviate from its announced policy. In the long term, such deviations would also harm the politicians, because time inconsistency would reduce their credibility substantially, and as a consequence their probability of being reelected for a new term.

If the relation $\lambda = \lambda(\tau)$ is substituted in equation (2.1) and (2.2), the first-order condition of the maximisation problem reads[7]

$$Z \equiv \frac{dD}{d\tau} = -\lambda_\tau (U((1-\tau)w) - U(\eta w)) - (1-\lambda) w U'((1-\tau)w) + \lambda \gamma w \left(1 - \frac{\epsilon_\tau^\lambda}{1-\lambda}\right) U'(\eta w) = 0 \tag{2.5}$$

The elasticity of the probability of being non-employed with respect to the tax rate is $\epsilon_\tau^\lambda = \lambda_\tau \frac{\tau}{\lambda}$. Compared to equation (2.4), this first-order condition is extended by the positive relation of tax rates on the non-employment rate. This relation has two effects on the policy variable. In the first place, it lowers the probability to receive labour income. This affects welfare negatively, if labour income is higher than benefit income. In the second place, higher tax rates reduce the probability of being employed, so it

[7]Appendix 2.1 presents the conditions for which the second-order derivative of the maximisation problem is negative, assuming constant relative risk aversion (CRRA).

raises the price of the social insurance system. This also harms welfare. For that reason the tax rate will be lower than λ, resulting in no full insurance.

This can be easily seen by substituting $\tau = \lambda$ in equation (2.5). The first term vanishes, and $(1-\lambda)U'((1-\tau)w)$ equals $\lambda\gamma U'(\eta w)$. Only the negative effect on the price of the social insurance system results. Thus, equation (2.5) has a negative sign for $\tau = \lambda$. This implies that the optimal tax rate has to be lower. In the optimum, the after-tax wage exceeds benefit income. Individuals then have a financial incentive to work. If the social insurance system fulfils this characteristic, we call the system incentive compatible. Due to the structure of the models used in this book, it is not always possible to prove that the incentive compatibility condition is satisfied for all parameter configurations. However, it will be assumed that there always exist at least some combinations of parameter values for which the condition is satisfied.

Take a close look at the first-order condition to see that the marginal costs of raising the tax rate consist of a lower probability of earning labour income, and lower net wages. The marginal benefit consists of a higher benefit level, and is positive only if $\frac{d\eta w}{d\tau} = \gamma w(1-\epsilon_{\tau}^{\lambda}/(1-\lambda)) > 0$, that is to say the proportional change in the non-employment rate has to be less than the proportional changes in the tax rate times the employment ratio. Whether or not this condition holds depends on the functional relation of $\lambda(\tau)$, which will often take a form like $(H-N(\tau))/H$, in which N represents the employment level. The precise relation with the tax rate will depend on the specific formulation of the various models in the following chapters. We will, however, assume that this condition is satisfied, such that $\frac{d\eta w}{d\tau} > 0$. In that case, the social insurance tax rate will be strictly positive.

This model shows a trade-off between insurance and economic efficiency. This closely corresponds to Varian (1980). Based on the insurance motive, there is a tendency to raise the tax rate, while economic efficiency demands lower tax rates in order to reduce the distortionary effects of taxes. This trade-off will be crucial in this book. The process of economic integration will just affect the distortionary effects of taxation, and thereby the trade-off between insurance and economic efficiency. This will influence social insurance policies. Note that this trade-off is not the only deviation from the full insurance solution. The remaining chapters will introduce some elements of redistribution between high and low-skilled workers, and capitalists/producers and workers. As a result, there is a trade-off between insurance, redistribution, and economic efficiency.

2.4 The Underpinning of the Decision-making Function

In section 2.3 the political welfare function, equation (2.1), consists only of the wellbeing of workers. Social insurance policies are based purely on the insurance motive. This section extends the model by adding some elements of the narrow self-interest theory. First, it is argued that various interest groups influence social insurance policy. Second, we present an underpinning of the decision-making function that consists of the wellbeing of these various interest groups.

In most countries social insurance is not financed by employees alone. Often there are specific employer-based taxes, and/or a part of the expenditures are financed directly by the government, see Atkinson (1987) and Barr (1992). These expenditures are paid by everyone in the form of income taxes and VAT. In principal, all people who contribute to or benefit from the system have an interest in influencing social insurance policies. Whether or not this will happen is not *a priori* clear. It depends on the possibility to form interest groups, as well as the homogeneity of such groups and their relative numerical strength (see Olson, 1965).

Some empirical work has been done in the eighties on the relation between interest groups and the social insurance budget, or the relative size of the government (measured as % of GDP). Because most of the government budget is used for redistributive expenditures, increases in the relative size of the government budget can be taken as a proxy for an increase in redistribution. For the Netherlands, Renaud (1989) concludes that the relative numerical strength of interest groups like the employees and capital owners (simply represented by self-employed) play indeed a significant role in social insurance policy. Lybeck (1986) concludes that the fraction of employees that joins organised interest groups affects positively the relative size of the Swedish government. In general, if the degree of unionization is taken as a measure for interest group strength, interest groups have a significantly positive effect on the relative size of the government (Lybeck, 1986). In some countries also the number of public servants has a positive effect on the size of the government.

From this research it can be concluded that redistribution is positively affected by interest groups, in particular employees. It will be assumed that workers and capital owners/producers are the relevant interest groups. The role of bureaucrats/public servants is ignored. The inclusion of bureaucracy theory is certainly a relevant element in the analysis of the efficient size of the welfare state. However, this line of research would introduce some normative reference point that is necessary to judge the possible inefficient size of the social insurance system. This book deals with the effects of integration on the welfare state from a positive approach. According to that approach

bureaucrats play an important role in government policy, but this is less interesting for the analysis of tax competition. The bureaucrats want to increase the size of the budget. This is easier if other countries also raise their tax rates. This implies that bureaucrats are interested in higher tax rates abroad. So, the inclusion of the interests of bureaucrats in the policy function would probably increase the scope for underprovision.

Coughlin et al. (1990a) present an underpinning for welfare functions consisting of various interest groups in two-party democracies. According to that theory, rational voters form expectations of their future utility under each party's victory based on the past performances, m, and current policy proposals, s, of both parties. The parties are denoted by g(government), and o(opposition). It is assumed that each voter belongs to one interest group. All members of an interest group, defined as individuals with the same tastes and the same income, have the same utility function with respect to past performances and current policy proposals. Probabilistic elements are introduced in the model by assuming that each voter has a political bias, b, in favour of ($b>0$) or against ($b<0$) the government. These biases follow from ideological and other non-policy related factors, such as personal characteristics of the candidates. For the political parties, this bias term is a random variable. More specifically, it is assumed that the bias term is distributed uniformly over all members of the interest group in a real interval. The density of this function is denoted by α_i for interest group i. Its' inverse represents the size of the interval.

Assuming that the difference between expected utilities of policy proposals of both parties lies in the interval for all possible policy proposals and past performances, the probability that a voter votes for party g is

$$P_{ij}^{g}(m_g,s_g,m_o,s_o) = \begin{array}{ll} 1 & \text{if} \quad U_{ij}(m_o,s_o) - U_{ij}(m_g,s_g) < b_{ij} \\ 0 & \text{if} \quad U_{ij}(m_o,s_o) - U_{ij}(m_g,s_g) \geq b_{ij} \end{array} \tag{2.7}$$

The subscript ij refers to member j of interest group i. By the introduction of a random distribution bias term one avoids the outcome of deterministic voting models that all members of one interest group vote for the same party. Now, the probability of getting voter ij's vote is a continuous function that rises smoothly as the government proposals get closer to a voters' ideal point. If the function is strictly concave, the equilibrium is unique (see, for a proof, Coughlin et al., 1990b). Probabilistic voting is a sufficient condition for the existence of an equilibrium in multidimensional voting models. The equilibrium is Pareto optimal with respect to the strategies.

Given the distribution of the bias term, and the preferences of the voters, each political party is assumed to choose its electoral platform to maximise its expected

margin of victory, ignoring the impact of the choice on the future values of the measures of its performance. A pair of strategies is in equilibrium if

$$s_p^* = \text{argmax} \sum_{i=1}^{n} n_i \alpha_i U_i(m_p, s_p) \qquad p = g, o \tag{2.8}$$

Each party acts as if it maximises an objective function, which is a specific weighted sum of the utilities of all individuals. The strategies (policies) depend on a weighted average of the preferred policies of all voters, and not only on the preferences of the median voter. The model explains the different weights of various interest groups in the policy function. Unfortunately, these differences are caused mainly by differences in the political bias term, a non-economic parameter.

The weights depend on the size of the groups and their homogeneity, as perceived by the politicians. It is possible for interest groups to diminish the uncertainty of political candidates with respect to their votes by lobbying. There is an interesting trade-off between the size and the homogeneity of the group. The work of Olson (1965) shows that it is difficult to organize large interest groups because the potential members have various interests, and there is a free-rider problem. An increasing number supporters of a group hurts the homogeneity, and can result in less political influence, although the size of the group has increased.

The resulting decision-making function is an additive (utilitarian) welfare function with different weights given to the various interest groups. As a consequence of these different weights, the quality of the votes differs. This welfare function deviates from a social welfare function because its underlying determinants are derived from the political process, and are not based on an ethical notion (utilitarian or Rawlsian). Because the weights are derived from the political process, the analysis is positive instead of normative. In most chapters this difference is not essential. All qualitative results remain unchanged if the decision-making function is replaced by a social welfare function, except for the analysis in chapter 6. In that chapter the insurance motive is not modelled. Redistribution from producers to workers occurs only, if workers have relatively more political weight than do producers.

The welfare function that follows from the probabilistic voting model corresponds closely to the interest group approach that is developed by van Winden (1983). In that approach politicians try to realize their own interests, but are constrained by the structure of the economy and the reactions of other groups, such as bureaucrats, voters or pressure groups. The resulting decision-making function that takes into account the utility of various groups is derived from cooperative Nash-bargaining games. The

indirect utility functions have to be specified as Cobb-Douglas functions. This specification is necessary for the Nash-bargaining outcome. Because redistribution is motivated by risk-aversion, the size of the social insurance tax rate depends on the degree of risk aversion in our model. For that reason we do not fix the degree of risk aversion by setting the degree of constant relative risk aversion at one, as is the case with Cobb-Douglas preferences. Therefore more general utility functions are used. The probabilistic voting model of Coughlin et al. (1990a) allows for more general functions.

2.5 The Basic Model in the Two-Country Case

Thus far, this chapter has concentrated on the modelling of social insurance policies within a country without taking into account any economic relation between countries. Sections 2.5 and 2.6 correct this shortcoming. They explain and discuss the assumptions made and methods used with respect to the two-country analysis. Section 2.5 focuses on the characteristics of the Nash equilibrium, and section 2.6 deals with the Pareto equilibrium.

As has already been observed in section 2.3, the effects of integration are primarily represented by changes in the insurance-efficiency trade-off. As full insurance would not be decided upon even without economic links between countries (because of the distortion of economic efficiency), these international links also affect that decision. Whether these international links exert an upward or downward effect on the social insurance tax rate will be one of the main questions in this book.

These links are modelled in a two-country world. The choice for an economic union consisting of two countries is based on the consideration that strategic interactions between countries are relevant. Models with many countries ignore these strategic interactions. That is also called the pure competitive case.[8] These models often represent federal economies, such as the United States with its 50 States. Because of the small size of the individual states compared to the total economy, effects of changes in decentralized fiscal policies on aggregate economic variables, and relative prices, such as the interest rate, are ignored. These fiscal policies do influence economic variables in other states. Otherwise, changes in tax rates would not affect welfare in other states.

The European Union consists of fewer member states, and some member states are relatively large compared to the total size of the EU economy. For these countries in particular, it would be a shortcoming to neglect the effects of their fiscal policies on

[8]See among others, Zodrow & Mieszkowski (1986) and Wildasin (1988).

aggregate economic variables and relative prices. These strategic interactions are not so important for some small member states. For these countries, these interactions could be ignored. This book will assume throughout that fiscal policies, in particular social insurance policies, affect economic variables, such as relative prices, in other countries.

Given this assumption, do countries take into account the relation between their policy variables and foreign welfare in policy making? The economic literature often makes the distinction between the cases of countries that do take into account these relations and those that do not.[9] These situations are labelled as the cooperative and noncooperative cases, respectively. Of course, these cases are extreme ones. One could imagine that countries take partially into account the effects of their policy decisions on welfare in other countries. Because it is the purpose to highlight the differences between the noncooperative and noncooperative cases, only these two extremes will be studied.

In the noncooperative case, countries are autonomous in determining their policies. This suggests that in deciding their optimal policy, countries take the policies of other countries as given. Therefore we use the Nash concept, which characterises the situation in which each country's fiscal policy is optimal given the fiscal policies of other countries. There is an equilibrium if both countries take the optimal policy of the other country as given. In this situation no country has an incentive to change its policy. In mathematical terms, this implies that if tax rates are used as policy instruments

$$\begin{aligned} \tau^{A*} &= \text{argmax } D^A(\tau^A, \tau^{B*}) \\ \tau^{B*} &= \text{argmax } D^B(\tau^{A*}, \tau^B) \end{aligned} \tag{2.9}$$

where $\tau^{I(*)}$ represents the (optimal) tax rate of country I. The concept assumes that both countries decide simultaneously on their fiscal policies. The international interactions between tax rates and foreign economic variables could be easily introduced in the basic model in section 2.3 by assuming that $\lambda^A = \lambda^A(\tau^A, \tau^B)$. A similar relation can be proposed for country B. However, to avoid the use of too many formulas, this book presents only the equations for one country if those of the other country have a similar structure.

Although the Nash concept seems to be the natural concept to describe noncooperative behaviour of member states, this is not always the case. In particular, if an economic union consists of one very large country compared to the second country, the fiscal policy of the large country probably affects welfare in the other country more heavily than is the case vice versa. In that case, one often uses the Stackelberg concept.

[9]See among others, Mintz & Tulkens (1986), Wildasin (1988), and Buiter & Kletzer (1991).

The large country takes into account the reaction of the small country in fiscal decision making, and the small country determines its fiscal policy in the same way as before (so it takes the policy of the large country as given). The large country is called the leader and the small country the follower. If country A is the large country this implies that

$$\begin{aligned} \tau^{A*} &= \text{argmax } D^A(\tau^A, \tau^B(\tau^A)) \\ \tau^{B*} &= \text{argmax } D^B(\tau^{A*}, \tau^B) \end{aligned} \tag{2.10}$$

The models used in this book do not apply the last concept, implying that the results here are of more relevance for countries that are more or less of equal size than for countries that differ in size substantially (in economic terms). However, this does not suggest that the Stackelberg concept is more appropriate to describe the economic links between large and small countries in fiscal decision making. It is far from clear that large countries, such as Germany, act as Stackelberg leader in fiscal policies.

Graphically speaking, the Nash equilibrium is the point at which the reaction curves of the two countries intersect. Reaction curves represent the optimal social insurance tax rates for any given foreign tax rate, so they represent the optimal tax rate as a function of the foreign tax rate. In the models used here, it is in general not possible to derive these curves explicitly. As a solution, we derive the slopes of both reaction curves by differentiating the first-order condition of the maximisation problem with respect to the home and foreign tax rates. Note, that the first-order condition, equation (2.5), depends on the foreign tax rate, because $\lambda^A = \lambda^A(\tau^A, \tau^B)$.

The signs of the slopes of the reaction curves are determined below. First, we will discuss the assumptions that are made to differentiate the first-order condition. In particular, it is troublesome to derive the signs of the derivative of $\frac{\partial\lambda}{\partial\tau}$. For that reason the elasticity ϵ_τ^λ is assumed to be constant. This is a simplifying assumption that supposes that the derivatives of $\frac{\partial\lambda}{\partial\tau}$ can be reasonably represented by the derivatives of $\frac{\lambda}{\tau}\epsilon_\tau^\lambda$. The validity of this assumption depends on the specific economic model. Note, however, that if the assumption does not hold, the results are not necessarily affected. The assumption of constant elasticities is meant primarily to derive the sign of the (partial) second-order derivatives of the welfare function. These derivatives consist not only of the derivatives of $\frac{\partial\lambda}{\partial\tau}$, but also of some first-order derivatives. It is possible that the derivatives of $\frac{\partial\lambda}{\partial\tau}$ have the same sign as the first-order ones or that the first-order derivatives dominate those of $\frac{\partial\lambda}{\partial\tau}$ that have an opposite sign. In both cases, the sign of the (partial) second-order derivative of the welfare function will not change. So, even if the assumption of constant elasticities does not hold, qualitative results will not necessarily change.

Given that $\lambda^A = \lambda^A(\tau^A, \tau^B)$, and that the elasticities are constant, differentiation of equation (2.5) with respect to the tax rates gives

$$\frac{dZ^A}{d\tau^A} d\tau^A + \frac{dZ^A}{d\tau^B} d\tau^B = 0 \tag{2.11}$$

$$\frac{dZ^A}{d\tau^B} = \frac{\partial Z^A}{\partial \lambda^A} \frac{\partial \lambda^A}{\partial \tau^B} \qquad \frac{\partial Z^A}{\partial \lambda^A} = (1 - \frac{\epsilon_\tau^\lambda}{1-\lambda}) \tau w^2 \frac{\partial \gamma}{\partial \lambda} U''(\eta w) > 0 \tag{2.12}$$

$\frac{dZ^A}{d\tau^A}$ has a negative sign, because the second-order condition of the maximisation problem has to be negative. $\frac{dZ^A}{d\tau^B}$ consists only of the partial effect on the non-employment ratio. $\frac{\partial Z^A}{\partial \lambda^A}$ represents the effect of a change in the non-employment ratio on the marginal welfare with respect to the home tax rate. The change in marginal welfare consists of three effects that are discussed below. First, the increase in the non-employment ratio has a negative effect on the benefit rate, due to a shrinking tax base. As a result, the gap between labour and benefit income grows as does the difference in welfare. This implies that the marginal costs of taxes increase. However, this effect is offset by a second effect in the basic model. The increase in the probability of being non-employed raises also the marginal benefit of the tax rate. The negative effects of an increase in the tax rate on the ratio of employed to non-employed are less harmful, such that the net marginal benefits of taxes are larger. In this model the first and second effect cancel out (not shown in equation (2.12)). This is not always the case in the models that are used further on. The third effect raises also the marginal benefit of taxes. Because the marginal utility of a benefit is larger, the positive effects of an increase in the tax rate on the benefit are also larger.

As a result, the total effect of an increase in probability of being jobless on the marginal utility with respect to the own tax rate, $\frac{\partial Z}{\partial \lambda}$, is positive. Because the increase in the foreign tax rate is assumed to exert a downward pressure on that probability, $\frac{\partial \lambda^A}{\partial \tau^B} < 0$, marginal welfare will be affected negatively. Thus, the home tax rate will be lowered. From this it follows that the reaction curves have a negative slope. Formally, the slope of country A's reaction curve reads

$$\frac{d\tau^A}{d\tau^B} = -\frac{dZ^A}{d\tau^B} \left(\frac{dZ^A}{d\tau^A} \right)^{-1} < 0 \tag{2.13}$$

So, in the Nash equilibrium the reaction curves have a negative slope. However, no attention has been paid to the existence and uniqueness of this equilibrium. Even if the reaction curves exist for all positive values of the foreign tax rates, a Nash equilibrium

does not necessarily exist. Therefore some additional restrictions must be placed on the model. One is labelled as the dominance assumption. This assumption says that the slope of country A's reaction curve is larger than the slope of country B's reaction curve in absolute terms. Using equation (2.13), this assumption implies that changes in the own tax rate have a larger impact on marginal utility with respect to the own tax rate than do changes in the foreign tax rate. This assumption also implies that the Nash equilibrium is stable. From this point of view, the dominance assumption is quite standard. Combining this restriction with the assumption that a positive tax rate exists, it follows that the reaction curves do intersect at least once. So, there exists at least one Nash equilibrium.

If the countries are identical, the value of the slope of country A's reaction curve is always the inverse of that of country B. Combining this with the dominance assumption, it follows that the slope of country A's reaction curve is larger than one in absolute terms. From this implication it follows that the reaction curves do intersect at most one time. So, adding the assumption that countries are identical to the other two guarantees that there exists one, unique Nash equilibrium with positive tax rates.

Before answering the question of whether the Nash equilibrium is Pareto efficient, it is interesting to know whether the presence of mobile production factors or trade exert a downward effect on the tax rates compared to the autarky case in section 2.3. In general, it is hard to answer this question. The mobility and autarky case are difficult to compare, because there are no explicit solutions for the tax rate. Therefore the first-order conditions are compared by substituting the one in the autarky case in the other one, equation (2.5) at the point where the variables of the autarky case are used. However, the derivatives in the first-order condition of the mobility case, are determined by all economic equations of the model, including the international economic relations. These international relations are the equations that specify international trade, capital mobility or migration. Taking the case of capital mobility, this equation implies that the after-tax returns on capital are equal in both countries. In general, the equations representing the last relations are violated if the variables resulting from the autarky case are substituted. In the case of capital mobility, this implies that the after-tax returns on capital are not equal in both countries.

Then, the comparison of both cases is only possible if the variables in the autarky case do not violate the equations that link both economies. That is to say, although mobility does not occur, because of autarky, these equations have to be satisfied. The structure of both autarkic economies has to be such that if the borders were to be hypothetically opened, the level of economic activity would be precisely the same as before without trade and mobile production factors at given tax rates. In the mobility

case, policymakers take into account these international economic relations in their decision-making process, while that is, of course, not the case in autarky. This effect can be seen in the magnitude of the derivative, $\frac{\partial \lambda}{\partial \tau}$ (>0). The values of this variable in the autarky and mobility case will determine the sign of the first-order condition. If the value is higher in the mobility case, a change in the tax rate affects the non-employment ratio more heavily. Because an increase in this ratio has a negative effect on welfare, the first-order condition will be negative, at the point in which the variables of the autarky case are substituted. This implies that the tax rate will be lower compared to the autarky case. Chapters 3 and 4 will use this method to analyse the differences between autarky and the mobility of the production factors labour and capital, respectively.

2.6 Coordination of Social Insurance Policies and Increasing Integration

The Nash equilibrium can be characterised as a situation in which countries maximise their own welfare, taking the social insurance policies of other countries as given. They do not take into account the effects of their policies on welfare abroad. In the basic model these spillovers are transmitted to the other country by $\lambda^B(\tau^A, \tau^B)$. Foreign welfare is affected by the change in the probability of being non-employed. Seen from the economic union as a whole, it is probably not efficient that countries neglect these externalities in their decision-making process. As has already been explained in section 1.4, these externalities can consist of taxes (implicitly) paid by non-residents (through higher commodity prices), changes in the tax base abroad, and tax revenues, changes in factor prices, output an employment abroad. All these externalities do not appear at once in the same model. The various models focus on different transmission channels. Each of these channels contains some externalities. In chapter 3 this channel is labour mobility, in chapters 4 and 7 capital mobility, and in the other chapters trade.

These externalities can be taken into account by introducing a central authority that internalises the external effects of policy making. This procedure is often followed (see among others Wildasin, 1991), in which external effects are corrected by a system of matching grants from the central government to lower-level authorities. Obviously, the implicit assumption in this approach is that a federal structure pre-exists, and that correcting externalities by social insurance policies is an important task of the central authority.

In the EU this assumption does not hold. On the contrary, the central EU level hardly has any authority in matters regarding the level of social insurance in the member states. In that case, internalisation of the external effects of autonomous decision making is possible only if policymakers of both countries voluntarily coordinate their decisions.

The term 'coordination' is used throughout the book to characterise the situation that both countries decide autonomously on the level of social insurance and take into account the external effects to the other country at the same time.

Coordination will only be agreed upon if both countries gain from it. This implies that the change in tax rates due to coordination has to have a positive effect on welfare. Coordination will be strictly welfare improving if

$$dD^I = \frac{dD^I}{d\tau^I} d\tau^I + \frac{dD^I}{d\tau^J} d\tau^J > 0 \qquad \forall \, I,J \in \{A,B\} \quad I \neq J \tag{2.14}$$

If this expression is evaluated at the Nash equilibrium, the first term cancels out for both countries. When the external effects, $\frac{dD^I}{d\tau^J}$, are both positive (negative), countries want to coordinate actions only if the foreign tax rate is raised (lowered) compared to the tax rates in the Nash equilibrium.

Suppose that countries coordinate their decisions by acting 'as if' they maximise the following welfare function

$$D^{I'} = D^A + D^B \qquad I = A,B \tag{2.15}$$

The optimal tax rate in the coordinated case is derived by differentiating this function to the tax rate.[10] We are not very interested in the level of that tax rate, but in its relation to the noncoordinated tax rate. Therefore the first-order derivative that results from maximising the welfare function in equation (2.15) is evaluated in the Nash equilibrium. As a result, this derivative is equal to

$$Z^{A'} \equiv \frac{dD^B}{d\tau^A} = \frac{\partial D^B}{\partial \lambda^B} \frac{\partial \lambda^B}{\partial \tau^A} > 0 \tag{2.16}$$

Equation (2.16) has a positive sign because the tax rate exerts a downward pressure on the foreign probability of being non-employed, and that probability affects welfare negatively, see section 2.5. This implies that the tax rate in the coordinated case (the Pareto one) will be higher than it is in the noncoordinated case. So, the provision of social insurance in the Nash equilibrium will be inefficiently low compared to the Pareto situation. If for some reason, the relation between the non-employment rate and the foreign tax rate is specified differently, such that $\frac{\partial \lambda^B}{\partial \tau^A} > 0$, the sign of equation (2.16) is negative. In that case there is overprovision of social insurance. Whether there is under-

[10]Given that the second-order condition of the maximisation problem in the noncoordinated case is negative, the second-order condition of this problem is also negative. This is due to the structure of the model.

of overprovision of social insurance, in both cases there is tax competition. Both countries use the tax rate as an instrument to improve their own welfare without taking into account the negative effects on foreign welfare.

This method can be used to determine whether there are international spillovers of policy making, and whether the provision of social insurance is inefficiently low or high in the Nash equilibrium. It is, however, not discussed how voluntary coordination is put into practice. Here we only deal with the question of whether decentralized social insurance policies are inefficient. The issue of whether coordination has to take the form of agreements on maximum or minimum tax rates, uniformly or varying per country, or Pigouvian subsidies between the countries is not analysed. It is difficult to correct the externalities completely with these instruments, because it is hard to calculate the size of the externalities in practice. It is, however, possible with these methods to reduce the externalities substantially. The EU agreements on the range of VAT rates and the proposals of the Ruding committee (CEC, 1992) to set minimum corporate taxes rates are examples of the first method. An example of the second method is a part of the German transfers to east-European countries that is used for agreements with these countries that they would not allow for illegal immigration to Germany from their countries.

This book does not analyse the methods that can be implemented for coordination of social insurance policies, but here some remarks will be made on that issue. With respect to the transfer of Pigouvian subsidies, countries that suffer most from the externalities are probably reluctant to subsidize directly the countries that cause these externalities. Although the transfers raise welfare, it is not politically feasible, because these subsidies could be interpreted as a reward for misbehaviour of the countries that cause the externality.[11] Therefore these subsidies have to be paid by the EU Commission, e.g. by using the structural funds. This would imply a substantial increase in the budget of the commission.

In agreements on tax rate levels or benefit levels, account has to be taken of the differences in welfare, production and growth in the various member states. Although in countries with a relatively low GDP the ratio of social insurance expenditures to GDP rises (Eurostat, 1993b), these countries could not afford to be as generous as the northern member states in providing benefits. In addition, countries have different preferences for social insurance, and their social insurance systems are developed in

[11] In the example of Germany and the east-European countries, the transfers could be defended by the argument that these countries do not have the means to reduce the negative externality. For more developed countries this argument does not hold.

different ways. These differences are also due to differences in risk aversion, equity, and the like. This suggests that uniform tax and/or benefit rates are not really welfare enhancing. Based on this consideration, agreements on minimum social insurance levels related GDP or wages in the various member states seem to be a better solution.

The second half of this section focuses on the effects of further integration of labour, capital and commodity markets. European integration is characterised by the increasing mobility of production factors, and trade in intermediate and final goods. Although political rhetoric says that markets are perfectly integrated as of 1993, mobility is not perfect in practice. Barriers between national markets do not disappear completely. That is not only valid for labour markets, but also for commodity markets. It is therefore necessary to introduce barriers to perfect mobility in the model in the form of migration costs, foreign investment costs, and nontariff barriers in commodity markets. These barriers affect the economy of the countries involved, represented in the relation $\lambda = \lambda(\tau^A, \tau^B, C)$, where C represents the mobility costs. We will examine the effects of lower mobility costs on social insurance policies. In the first place, the effect on the tax rates in the Nash equilibrium are analysed. For an individual country these effects could be examined by differentiating the first-order condition, equation (2.5), with respect to the tax rate and mobility costs. Because the signs of the derivatives of $\frac{\partial \lambda}{\partial \tau}$ cannot be derived, also here the elasticity $\epsilon_{\tau}^{\lambda}$ is introduced and assumed to be constant. So, from equation (2.5)

$$\frac{dZ}{d\tau^A} d\tau^A + \frac{dZ}{dC} dC = 0 \qquad \frac{dZ}{dC} = \frac{\partial Z}{\partial \lambda} \frac{\partial \lambda}{\partial C} \tag{2.17}$$

$\frac{dZ}{d\tau^A}$ represents the second-order condition of the maximisation problem and is assumed to be negative. $\frac{\partial Z}{\partial \lambda}$ is derived in equation (2.12) and has a positive sign. Assuming that lower mobility costs or trade barriers stimulate economic activity, and the probability of being employed, $\frac{\partial \lambda}{\partial C} > 0$. As a result lower mobility costs have a downward effect on the tax rate, given the foreign tax rate. This is a partial equilibrium result, because policymakers abroad will also change their policy in reaction to lower mobility costs. For the complete analysis of the change in the tax rates, account must be taken of the change in the foreign tax rate in equation (2.17). So, $\frac{\partial Z^A}{\partial \tau^B} d\tau^B$ has to be added to this equation. For country B a similar equation results. If that equation is substituted for the foreign tax rate in equation (2.17), it follows that

$$\left(\frac{dZ^B}{d\tau^B}\frac{dZ^A}{d\tau^A} - \frac{dZ^A}{d\tau^B}\frac{dZ^B}{d\tau^A}\right)d\tau^A + \left(\frac{dZ^B}{d\tau^B}\frac{dZ^A}{dC} - \frac{dZ^A}{d\tau^B}\frac{dZ^B}{dC}\right)dC = 0 \qquad (2.18)$$

The term preceding $d\tau^A$ represents the difference between the slopes of country B's and country A's reaction curve multiplied by the product of two negative derivatives. Given the dominance assumption, the sign of the expression preceding $d\tau^A$ is positive. If countries are more or less similar such that $\frac{dZ^A}{dC} = \frac{dZ^B}{dC} > 0$, and $\frac{dZ^B}{d\tau^B} < \frac{dZ^A}{d\tau^B} < 0$, the sign of the expression preceding dC is negative. Then $\frac{d\tau^A}{dC} > 0$. This result also prevails in the partial analysis. Because of the dominance assumption the results of the partial analysis will carry over to the general analysis. For that reason succeeding chapters will present only the more simple partial analyses.[12]

In addition to the change in the noncoordinated tax rates, we are also interested in the effects on the externalities of noncoordinated decision making. Changes in the external welfare effects affect the desirability of coordination. These effects depend not only on the change in the noncoordinated tax rate, but also on the change in the coordinated tax rates due to lower mobility costs. $Z^{A'}$ in equation (2.16) represents the external effects from noncoordinated decision making. The change in these effects is analysed by differentiating the absolute value of this marginal externality with respect to the mobility costs, $\frac{\partial|Z^{A'}|}{\partial C}$. If the absolute value increases due to lower mobility costs, $\frac{\partial|Z^{A'}|}{\partial C} < 0$, a change in the tax rate has more effect on foreign welfare. If the curvature of the welfare functions do not change too much due to changes in mobility costs, this suggests that the externality is increased, and so are the gains of coordinating social insurance policies. Ghosh (1991) follows this method in analysing the effects of more countries on the marginal externality. It is not an ideal measure for considering the effect of increasing integration on the desirability of coordinating social insurance policies. It gives, however, an indication about the change in the size of the externality. The value of this measure depends on the changes in the curvature of the welfare function due to changes in mobility costs. Chapter 6 presents a better measure for analysing the change in external effects due to further integration. Unfortunately, this measure applies only to some specific models, because of analytical tractability.

[12]The assumption that countries are identical is not necessary. In some models in which this assumption does not hold the sign of the expression preceding dC can easily be established, because both parts of this expression have the same sign.

Appendix 2 The Second-Order Condition

This appendix presents the second-order derivative of the maximisation problem belonging to equation (2.5). Before differentiating the first-order condition, ϵ_τ^λ is substituted for the derivative of λ. This elasticity is assumed to be constant. In addition, it is assumed that the utility functions are of the constant relative risk aversion (CRRA) type, $U(x) = x^{1-\sigma}/(1-\sigma)$. σ represents the elasticity of the change in marginal utility with respect to income, and is equal to the degree of risk aversion. If the derivatives of the utility function in the first-order condition, equation (2.5), are rewritten using this specific utility function, the first-order condition reads

$$\begin{aligned} Z &= -U((1-\tau)w)\frac{dUW}{d\tau} + U(\eta w)\frac{dUB}{d\tau} = 0 \\ \frac{dUW}{d\tau} &\equiv \epsilon_\tau^\lambda + (1-\sigma)\frac{\eta}{1-\tau} \qquad \frac{dUB}{d\tau} \equiv \epsilon_\tau^\lambda + (1-\sigma)(1-\frac{\epsilon_\tau^\lambda}{1-\lambda}) \end{aligned} \tag{A2.1}$$

This equation is differentiated with respect to the tax rate. The resulting expression can be simplified by rewriting the derivatives of the utility function as utility functions, and substituting equation (A2.1) for the utility of after-tax wage income. Then, the second-order condition reads

$$\frac{dZ}{d\tau} = (1-\sigma)U(\eta w)\left[\left(\frac{1}{1-\tau} + \frac{1}{\tau}(1-\frac{\epsilon_\tau^\lambda}{1-\lambda})\right)\frac{dUB}{d\tau} + \left(-\frac{\gamma}{(1-\tau)^2} + \frac{\epsilon_\tau^\lambda}{\lambda(1-\tau)}\right)\frac{dUB/d\tau}{dUW/d\tau} - \frac{\gamma\epsilon_\tau^\lambda}{\tau(1-\lambda)^3}\right] \tag{A2.2}$$

Equation (A2.2) has a negative sign if the total term is brackets is negative. The expression in brackets consists of three terms. The third term is negative. Because $-\frac{\gamma\lambda}{1-\tau} + \epsilon_\tau^\lambda < 0$, and the first-order condition shows that $\frac{dUW}{d\tau}$ and $\frac{dUB}{d\tau}$ are positively related to each other, the second term in the total expression in brackets (which is the combination of these two facts) has a negative sign. Given that $\epsilon_\tau^\lambda < 1-\lambda$, a sufficient condition for a negative second-order derivative of the maximisation problem is $\frac{dUB}{d\tau} \leq 0$. This implies that $\sigma \geq \frac{1-\lambda-\lambda\epsilon_\tau^\lambda}{1-\lambda-\epsilon_\tau^\lambda} > 1$. If the parameter σ suffices this condition, the second-order condition is negative. Note that this condition does not imply that $\frac{d\eta w}{d\tau} > 0$. That is an additional restriction.

Chapter 3

Labour Mobility[1]

3.1 Introduction

This chapter focuses on the relation between labour mobility and social insurance systems. Although the internal market programme in the EU mainly deals with the integration of capital and commodity markets, labour markets are integrated as well. At the moment the formal restrictions to labour mobility within the EU are withdrawn.[2] However, in practice migration is hampered by lack of mutual recognition of qualifications and diplomas, transfers of social insurance rights to the migration country that are built up in the home country, transparency of the EU labour market on the demand and supply side, and the like.

The integration of labour markets will probably intensify labour flows within the EU. The size of these flows is partly determined by the level of social insurance, in particular the contributions. On the other hand, migration influences social insurance contributions and expenditures. Thus, policymakers have to take account of migration behaviour in social insurance policies. In recent years, a lot of research has been done on the consequences of goods and capital flows on indirect and capital tax levels. One concludes often that tax competition, that pushes the tax rates down, is likely to occur. It is important to examine whether this is also likely to happen with social insurance policy. Another and related issue is whether centralisation of decision-making processes can be agreed upon to improve the welfare of all countries concerned. Is there a need for a European federal transfer structure or could downward pressures on the system only be corrected by coordinating the decisions between the countries?

We focus the attention on the relation between labour mobility and social insurance systems from a public choice approach. Unlike most earlier models of social welfare, see the papers of Pauly (1973), Brown & Oates (1987) and Wildasin (1991), discussed in section 1.4, both workers and beneficiaries have political influence in social insurance policies.[3] Moreover, the system is not motivated by altruism of the rich towards the

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[1]This is a slightly modified version of Lejour & Verbon (1994).

[2]Note that the right to reside in other member states depends on the individuals' own means for providing support, such as labour income, pensions and grants. By law migrants do not have immediately access to social insurance programs in the migration country. This rule prevents migration motivated by higher social benefits in the migration country.

[3]Actually, in the model of Brown & Oates the median voter is decisive in determining the size of the social welfare system. However, as the beneficiaries are assumed to be in the minority, they have no effective say in the decision-making process. Recently, Van Winden & Mazza (1994) also studied the relation between migration and redistribution from a public choice approach. Contrary to our model, they

poor, but by a preference for social insurance which provides benefits in case of lay-off for all individuals. In our model, individuals are aggregated in two groups. The first group consists of individuals who have good opportunities on the labour market and the second group consists of individuals who have less opportunities (we label these groups as low-risk and high-risk, respectively, where risks refer to the opportunities on the labour market). Based on their expected utility, both groups of workers prefer to have social insurance. However, due to the different risks of losing labour income, the preferred coverage differs among the two groups. We consider two countries with possibly a different level of social insurance and a different wage rate. In both countries the population consists of high and low-risk workers, which may be mobile. The labour markets of both countries are integrated and wages are determined endogenously. We share the characteristic of endogenous wages with Wildasin (1991). But, unlike Wildasin, we assume that workers of both groups are equally productive.

The effects of mobility of both groups are considered in turn. Migration is based on differences in expected utility that may spring from differences in social insurance systems, but also from differences in wages. A migration flow in turn affects the wage rate through its effects on marginal productivity, and the 'price' of the social insurance system through its effect on the relative size of the groups in the countries concerned. By these induced effects the preference for social insurance of both groups will change. The direction of this change depends on the risks of the migrants. The analysis of the mobility of low-risk workers distinguishes this chapter from the literature, such as Gramlich (1985) and Brown & Oates (1987). It will appear that if this group is mobile the distribution of political power among the two groups can be a qualitatively important determinant for social insurance policy. In particular, high-risk workers might have an interest in lowering tax and benefit rates to attract low-risk workers, while low-risks prefer higher tax and benefit rates to avoid an increase of low-risks. However, if high-risk workers prefer a higher tax rate, or, if they are not politically decisive, the possibility of migration of low-risk workers has an upward effect on the tax rate in our model. In the more conventional case that the high-risk workers are mobile, our result that mobility leads to a lower coverage of the social insurance system corresponds to the results in the literature. So, if the mobility of the low-risk group is much larger than the mobility of the high-risk group, the results of our model suggest that European economic integration does not necessarily cause a deterioration of the social insurance level. In that case, coordination of decision making could lower the average benefit level, contrary to the case when the high-risk group is mobile.

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also model capital owners as a relevant interest group.

Decision making on social insurance is modeled analogous to Verbon (1990). Section 3.2 introduces this model and extends it to migration of low-risk and high-risk workers. Sections 3.3 and 3.4 examine the tax rates that result from the decision-making process, both in an one-country and two-country analysis. We compare the tax and benefit rates with the situation in which migration is not possible. The effects of coordinated decision making between the countries including the possibility of a grant structure are considered in section 3.5. Section 3.6 discusses the effects of ongoing integration represented by an exogenous change in the mobility costs. At the end of the chapter we discuss briefly some generalisations of the model and summarise the main results.

3.2 The Social Insurance Model and Migration Behaviour

We develop a two-country model to study the effects of migration on social insurance policies. Social insurance systems have two important characteristics. First, they insure people against the risk of losing their labour income, for example, because of illness, disability or dismissal. Second, the systems are redistributive, because people do not face the same risk, but they pay the same tax rate and get the same benefit rate. Money is, thus, redistributed from low-risk individuals to high-risk individuals. Both characteristics are captured in our model by assuming two groups which have different risks of being non-employed, but are equal in all other aspects. These risks are assumed to be exogenous and equal to λ_1 and λ_2 with $\lambda_1 < \lambda_2$. Every worker receives a wage rate, w, and pays a contribution, τw, to the social insurance system, while every worker out of the production process receives a benefit, ηw.[4] Both groups have a say in the decision on the level of the tax rate, τ, and the benefit rate, η.

Migration flows change the workers-beneficiaries ratio in the country from which people migrate, the home country, and in the country to which they migrate, the migration country. These changes will affect social insurance policies. Assuming that A is the migration country, the closed budget constraint of the system within a country equals

$$\left[\lambda_1(H_1+M_1)+\lambda_2(H_2+M_2)\right]\eta w = \left[(1-\lambda_1)(H_1+M_1)+(1-\lambda_2)(H_2+M_2)\right]\tau w \qquad (3.1)$$

where H_i represents the initial size of group i (i = 1,2), M_i the size of the net migration flow of group i from country B to A, which is assumed to be endogenous, and w the endogenous wage rate. We assume that a worker faces in both countries the

[4]Because we concentrate on the effects of labour mobility, we abstract from the fact that net wages and benefits are determinants in individual labour supply decisions by assuming inelastic labour supply.

same risk of being jobless. Given the definition of M_i the budget constraint of the home country has the same structure, except for the negative signs before M_i.

Since high-risk and low-risk workers face a different risk, they desire a different level of social insurance to cover their risk of being jobless. Each group of workers forms an interest group to pursue their wishes in the political decision-making process. The interest groups obtain political influence by voting and by lobbying. The decision-making function has the following form

$$D = \xi E(U_1) + (1-\xi)E(U_2) \tag{3.2}$$

where ξ represents the relative political weight of group 1 in the decision-making process, which is assumed to be exogenous. $E(U_i)$ is the expected utility of a member of group i, defined by

$$E(U_i) = (1-\lambda_i)U((1-\tau)w) + \lambda_i U(\eta w) \qquad i = 1,2 \tag{3.3}$$

where $U(\ )$ represents the utility of the net wage and benefit level, respectively. It is assumed that the indirect utility function is twice continuously differentiable, marginal utility is strictly decreasing, and the Inada conditions are fulfilled. Using equation (3.1) and (3.3) D is written as

$$\begin{gathered} D = \delta_1 U((1-\tau)w) + \delta_2 U(\gamma\tau w) \\ \delta_1 \equiv \xi(1-\lambda_1) + (1-\xi)(1-\lambda_2) \qquad \delta_2 \equiv \xi\lambda_1 + (1-\xi)\lambda_2 \end{gathered} \tag{3.4}$$

$$\gamma = \frac{(1-\lambda_1)(H_1+M_1) + (1-\lambda_2)(H_2+M_2)}{\lambda_1(H_1+M_1) + \lambda_2(H_2+M_2)} \tag{3.5}$$

Ignoring the possibility of migration for the moment, each group would choose full insurance, if insurance would be possible within the own risk group. However, by pooling both risk groups into one comprehensive social insurance system, the system is no longer actuarially fair. Obviously, as high-risk workers gain from pooling, they prefer a more than complete coverage of their risk, while the reverse is true for low-risk workers. Whether less or more than full insurance will actually be chosen depends on the political weights of the groups, the migration flow, and the price of the system, $\frac{1}{\gamma}$. In case both groups have influence, it is clear that $\frac{\partial E(U_1)}{\partial \tau} < 0$ and $\frac{\partial E(U_2)}{\partial \tau} > 0$, at the optimal tax rate.

Individuals from both risk groups have the opportunity to move to another country. Corresponding to the 'human capital' approach of migration,[5] people migrate if their expected welfare in the migration country outweighs their expected welfare in the home country plus migration costs. These costs which consist of physical and psychological costs do even exist if all barriers to labour mobility are removed in the process of economic integration. So, people move from country B to A if

$$E(U_i^A) > E(U_i^B) + C_i \qquad i = 1,2 \tag{3.6}$$

where C_i represents the migration costs for a member of group i.[6] For simplicity we only consider the migration flow from country B to A. Higher expected utility in country A is caused by an other population structure, and/or political constellation, and/or the labour productivity, compared with country B.

Migration is in equilibrium if no one has an incentive to migrate any more. This is the case if the difference between the expected utilities is equal to the migration costs or if all members of a group have migrated to one country. In the model these possibilities can be distinguished from each other by the validity of the stability condition of migration, see Stiglitz (1977). If the stability condition holds, there is an internal equilibrium with people living in both countries. So,

$$E(U_i^A) = E(U_i^B) + C_i \quad \text{if} \quad M_i^s \equiv \frac{\partial E(U_i^A)}{\partial M_i} - \frac{\partial E(U_i^B)}{\partial M_i} < 0 \qquad i = 1,2 \tag{3.7}$$

If an internal equilibrium exists, it follows that, apart from differences in the wage rate, the migration flow is determined by differences in the social insurance system that outweigh migration costs, $M_i = M_i(\tau^A, \tau^B, C_i)$ $i = 1,2$. If the migration equilibrium is distorted by a change in the system, migration will occur, until a new equilibrium is reached, which is guaranteed by the validity of the stability condition. The relation between changes in the tax rate and changes in the size of the migration flow can be obtained by differentiating the migration equilibrium condition, equation (3.7), with respect to the tax rate and the migration flow.

[5]See for a survey on the determinants of migration, Greenwood (1975).

[6]For simplicity we assume that $\frac{\partial C_i}{\partial M_i} = 0$, instead of positive. If the latter assumption is reasonable, our results will even hold with less stringent assumptions on the congestion effects.

$$\frac{\partial M_i}{\partial \tau^I} = s^I \mathrm{M}_i^{s^I - 1} \frac{\partial E(U_i^I)}{\partial \tau^I} \qquad s^A = -1,\ s^B = 1 \qquad \mathrm{I} = \mathrm{A,B} \qquad \mathrm{i} = 1,2 \tag{3.8}$$

Because $\frac{\partial E(U_1^A)}{\partial \tau^A} < 0$ ($\frac{\partial E(U_2^A)}{\partial \tau^A} > 0$), it follows that $\frac{\partial M_1}{\partial \tau^A} < 0$ ($\frac{\partial M_2}{\partial \tau^A} > 0$) in case the migration equilibrium is stable. The results for the home country are the opposite.

The assumption is used throughout that policymakers know that the level of social insurance is a determinant of migration decisions. They will take account of this knowledge in their decisions on social insurance. The relation between migration and social insurance policy is analogous to Pauly (1973) and Starrett (1980), who also capture the influence of migration on decision making. It is important to note that, because the social insurance system is not actuarially fair, migration behaviour influences the price of the system. For that reason, it is not a good strategy for policymakers to be myopic on migration behaviour in their decision making, as Boadway (1982) argues in a slightly different context.

Policymakers will not only take the effects of migration behaviour on the social insurance system into account, but also the effects on the real wage rate. Therefore we consider a production function, $F(N)$, with positive, but decreasing marginal productivity of labour and the employment level, N, is equal to $(1-\lambda_1)(H_1+M_1) + (1-\lambda_2)(H_2+M_2)$.[7] Labour is the only production factor to highlight the impact of labour mobility between the countries. Because the wage rate is determined by marginal labour productivity, an increase in the labour force by migration lowers the wage rate in country A, $w_{M_i} \equiv \frac{\partial w}{\partial M_i} = \frac{\partial w}{\partial N}\frac{\partial N}{\partial M_i} = (1-\lambda_i)\frac{\partial^2 F(N)}{\partial (N)^2} < 0$, and raises it in B.[8] Given these assumptions we derive, for later purposes, the effects of migration on expected utility.

$$\frac{\partial E(U_i)}{\partial M_j} = (1-\lambda_i)(1-\tau) w_{M_j} U'((1-\tau)w) + \lambda_i \tau \left(\frac{\partial \gamma}{\partial M_j} w + \gamma w_{M_j} \right) U'(\eta w) \qquad \mathrm{i,\ j} = 1,2 \tag{3.9}$$

[7] To emphasize differences in the probability of getting laid off, both groups of workers are equally productive. Later on, we will discuss the issue of different productivities. For country B, the size of the migration flow has to be subtracted from the initial size of the groups.

[8] In the models used further on, the wage rate is determined by wage bargaining. Then, the wage is a function of $w = w(\tau, H_i+M_i, N)$. If the derivatives with respect to the tax rate and employment would be positive, and to the labour force negative, it would follow that $w_{M_i}{}^A < 0$, $w_{M_i}{}^B > 0$ as is also the case here. So, introducing wage bargaining would not affect the qualitative outcomes.

3.3 The Social Insurance Tax Rate for One Country

This section discusses the optimal tax rate if policymakers take account of the migration flow, given the level of social insurance in the other country. The political decision-making function, equation (3.4), is maximized taking into account the effect of a change in the system on migration behaviour. The first-order condition equals[9]

$$Z \equiv \frac{dD}{d\tau} = \delta_1 \frac{d(1-\tau)w}{d\tau} U'((1-\tau)w) + \delta_2 \frac{d\eta w}{d\tau} U'(\eta w) = 0$$

$$\frac{d(1-\tau)w}{d\tau} = -w + (1-\tau)\frac{\partial w}{\partial \tau} < 0 \qquad \frac{d\eta w}{d\tau} = \gamma w + \tau \frac{\partial \gamma}{\partial \tau} w + \tau \gamma \frac{\partial w}{\partial \tau} > 0 \qquad (3.10)$$

$$\frac{\partial w}{\partial \tau} = w_{M_i} \frac{\partial M_i}{\partial \tau} \qquad \frac{\partial \gamma}{\partial \tau} = \frac{\partial \gamma}{\partial M_i} \frac{\partial M_i}{\partial \tau}$$

The first part of this equation measures the negative effect of an increase in the tax rate on the utility of the net wages, the marginal costs, while the second part measures the positive effect on the utility of the benefit level, the marginal benefits. In the optimum, marginal costs equal marginal benefits. The marginal costs arise from two effects. One is the direct effect on the net wage and the other one is the indirect effect on the wage rate through the induced migration flow. The marginal benefits are decomposed in three effects: first, the direct effect of the tax rate, second, the indirect effect on the price of the social insurance system through the induced migration flow, and third, the change in the wage rate. The signs of these derivatives depend on the fulfilment of the stability condition. The analysis is simplified by assuming from now on that only one group is mobile at the same time.

First, we discuss the mobility of high-risk workers. From equation (3.5) and the assumptions with respect to the production function we know that $\frac{\partial \gamma}{\partial M_2}$ and w_{M_2} both have a negative (positive) sign for the migration (home) country. Since, policymakers take the tax rate in the other country as given, the sign of $\frac{\partial M_i}{\partial \tau}$ follows from equation (3.8). From equation (3.9) it follows that migration unambiguously lowers expected utility of both groups in country A and raises it in B. This implies that the stability condition holds and therefore $\frac{\partial \gamma}{\partial \tau}$ and $\frac{\partial w}{\partial \tau}$ have a negative sign for both countries.

Given these results it follows that the tax rate in both countries will be lower, given the tax rate in the other country, compared to the case when migration is not possible (autarky). As is explained in section 2.5 the comparison between the mobility and

[9]Appendix 3.1 presents the conditions that guarantee a negative second-order derivative.

autarky case can only take place at the point that the migration equilibrium, equation (3.7), is hypothetically satisfied in the autarky case. The wage rate and the price of the system are exogenous at that point. From evaluating equation (3.10), it follows that Z has a negative sign. The reason is quite clear. Because a possible inflow of high-risk workers in country A implies a decrease in utility for both groups, see equation (3.9), both groups opt for a lower tax rate in order to prevent an increase in the size of the high-risk group in their country. In country B both groups desire a lower tax rate to stimulate emigration.

From the first-order condition, equation (3.10), it follows that not only the tax rates are lowered if migration becomes possible, but also the benefit levels in both countries are lower, $\frac{d\eta w}{d\tau} > 0$. For both countries this implies that the effect of a change in the tax rate has a larger impact on the benefit level than the opposite effect of the change in the price of the system. Note, that in countries with rigid wage rates, policymakers will set higher tax rates than they do in countries with more flexible wage rates.

In case low-risk workers are mobile, it is not guaranteed that the stability condition is fulfilled. The negative congestion effects of migration on the labour market in country A ($w_{M_1} < 0$) may be compensated by the decrease of the price of the system ($\frac{\partial \gamma}{\partial M_1} > 0$), see equation (3.9). In that case the stability condition will not hold and all low-risk workers migrate to country A. The country with the more favourable political and/or population conditions or higher wage level will attract all low-risk workers. Barring this unlikely case, we assume that $\frac{\partial E(U_1^A)}{\partial M_1} < 0$ and $\frac{\partial E(U_1^B)}{\partial M_1} > 0$, the stability condition will, thus, hold. In other words, near the equilibrium the effect of migration on the utility of the low-risk workers is dominated by the congestion effect on the labour market and not by the change in the price of the social insurance system. Given these assumptions, it holds for both countries that $\frac{\partial w}{\partial \tau} > 0$ and $\frac{\partial \gamma}{\partial \tau} < 0$.

These two opposite effects complicate the comparison of the mobility and autarky case if low-risks are mobile. The congestion effects on the labour market exert an upward effect on the tax rate, because policymakers want to decrease the number of low-risks. On the other hand, as an inflow of low-risk workers decreases the price of the system, there is a tendency to decrease the tax rate. If the first-order condition is evaluated in the point where migration is not possible, and the migration equilibrium is hypothetically satisfied, tax rates will be higher in the mobility case if the following inequality is fulfilled.

$$Z_{aut} = \frac{\partial D}{\partial M_i}\frac{\partial M_i}{\partial \tau} = \delta_1(1-\tau)\frac{\partial w}{\partial \tau}U'((1-\tau)w) + \delta_2\tau\left[\frac{\partial \gamma}{\partial \tau}w + \gamma\frac{\partial w}{\partial \tau}\right]U'(\tau\gamma w) > 0 \quad (3.11)$$

Because $\frac{\partial M_1}{\partial \tau^A} < 0$, the tax rate in country A is higher, if $\frac{\partial D^A}{\partial M_1} = \xi\frac{\partial E(U_1^A)}{\partial M_1} + (1-\xi)\frac{\partial E(U_2^A)}{\partial M_1}$ has a negative sign. This is not guaranteed because it follows from equation (3.9) that the sign of $\frac{\partial E(U_2^A)}{\partial M_1}$ is not determined. Although $\frac{\partial E(U_1^A)}{\partial M_1} < 0$, equation (3.9) shows that $\frac{\partial E(U_2^A)}{\partial M_1}$ can be positive provided that the parameter λ_2 is large enough compared to λ_1. In words, high-risk workers might prefer an increase in the migration flow of low-risk workers, whereas for low-risk workers the opposite holds. From this reasoning it follows that the distribution of political power among the two groups can be an important determinant of the effects of labour mobility in an integrated market. In particular, if in both countries the political power of high-risk workers is large enough and $\frac{\partial E(U_2^A)}{\partial M_1} > 0$, the tax rate in both countries will be lower than it will be in autarky.[10] Moreover, if the relative political power of the two groups differ in the two countries, the effects on the tax rate can be different.

Finally, in the case that the political power of the low-risk workers is large enough in both countries or high-risk workers do not prefer more low-risk workers, so $\frac{\partial D^A}{\partial M_1} < 0$ and $\frac{\partial D^B}{\partial M_1} > 0$, the tax rates will be higher in autarky given the tax rate in the other country. Then, the benefit levels will also be higher in both countries. In the sequel, we will concentrate on the last distinguished case as a benchmark case.

3.4 The Social Insurance Tax Rate in the Nash Equilibrium

The previous section derived the optimal tax rate given an arbitrary tax rate of the other country. It is of interest to consider the relation among the tax rates in the two countries and to examine the Nash-equilibrium. We will pursue this by deriving the reaction functions. From the first-order condition it follows that the level of the tax rate depends on the size of the migration flow and the foreign tax rate, so $\hat{\tau}^A = \tau(M_i, \tau^B)$ for $i = 1,2$. The differential form of this function is determined by differentiating the first-order condition, equation (3.10), with respect to both tax rates and the migration flow. This is fairly complicated because $\frac{\partial M_i}{\partial \tau}$ has to be differentiated. Therefore the elasticity $\epsilon_\tau^{M_i} \equiv \frac{\partial M_i}{\partial \tau}\frac{\tau}{M_i}$ is substituted in the first-order condition and assumed to be constant. Differentiating this condition gives

[10] Note, that we have the paradoxical result that much political power of the high-risk group will lead to a lower tax rate.

$$\frac{dZ^A}{d\tau^A}d\tau^A + \frac{dZ^A}{d\tau^B}d\tau^B = 0 \qquad \frac{dZ^A}{d\tau^I} = \frac{\partial Z^A}{\partial \tau^I} + \frac{\partial Z^A}{\partial M_i}\frac{\partial M_i}{\partial \tau^I} \qquad I = A,B \quad i = 1,2 \quad (3.12)$$

Equation (3.12) gives the derivatives of the reaction functions, i.e. it describes how the tax rate of one country reacts to a change in the tax rate of the other country. $\frac{dZ^A}{d\tau^A}$ represents the second-order condition of the maximisation problem and is negative. The sign of $\frac{dZ^I}{d\tau^J}$ depends on the parameters of the utility and production function, in particular the value of the elasticity of the marginal utility with respect to income. Appendix 3.1 shows that if this elasticity is sufficiently large (necessarily larger than one), $\frac{dZ^A}{d\tau^B} < 0$ for both countries irrespective of the risk of being non-employed of the mobile group. This result is explained below.

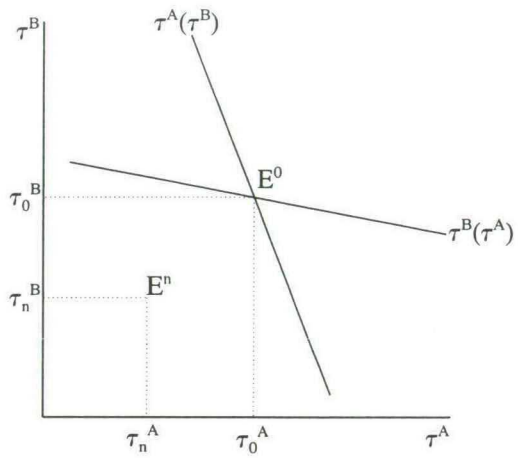
The total derivative $\frac{dZ^A}{d\tau^B} < 0$ consists only of the partial derivative that induces changes in the migration flow, $\frac{\partial Z^A}{\partial M_i}$. In general, a change in the migration flow affects the marginal costs and benefits of the social insurance system. If low-risks migrate to the country these costs and benefits are affected by two sources.[11] First, an increase of low-risk workers raises congestion costs. This is a reason to increase the tax rate. Second, by the lower price of the system migration has a positive effect on the benefit rate, and a negative effect on its marginal utility. The latter effect dominates the former if $1-\sigma < 0$. Because it is assumed that σ is sufficiently large, the net effect of the second source dominates the congestion effect of the first source such that $\frac{\partial Z^A}{\partial M_1} < 0$. As $\frac{\partial M_1}{\partial \tau^B} > 0$ the total derivative is negative. If high-risks migrate the congestion effects on the labour market also increase, and the social insurance system becomes more expensive. If σ is large enough (>1), the latter effect dominates such that migration has a positive effect on the marginal utility of the benefit, $\frac{\partial Z^A}{\partial M_2} > 0$. Because an increase in the foreign tax rate diminishes the flow of high-risk workers, the total derivative is negative. For the foreign country all effects work in the opposite direction. As a result, $\frac{dZ^B}{d\tau^A}$ has also a negative sign.

From these results it follows that both total derivatives in equation (3.12) have a negative sign. The reaction curves, thus, have a negative slope in the neighbourhood of the equilibrium. If we stick to the case that the high-risk group experience a lower utility due to an increase in the size of the low-risk group or that they have no decisive political power, we know from the analysis in section 3.3 that both countries set a higher tax rate if migration of low-risks is possible, given the tax rate in the other country. As a result, tax rates will be higher in the Nash equilibrium compared with the situation in which migration of low-risk workers is not possible. This is illustrated in

[11] These two sources are represented by the first and second line of equation (A3.3), respectively.

figure 3.1. If high-risk workers are mobile, in both countries the levels of the tax rate and benefit are lower in the Nash-equilibrium compared to the autarky case.

Figure 3.1 The Nash equilibrium and the nonmigration case with mobile low-risks



3.5 Coordination of Social Insurance Policies

Until now policymakers maximise the decision-making function in their country, while taking the decisions in the other country as given. As is well known, such behaviour is inefficient because both countries neglect the benefits and costs of their own decisions accruing to the other country, e.g. if the migration country lowers (raises)the tax rate to prevent migration of high-risk (low-risk) workers, the home country faces the costs of less migration. Such externalities can be taken into account by coordination. Coordination will only be agreed upon if both countries gain from it. Writing the political decision-making function as $D^A = D^A(\tau^A, M_i(\tau^A, \tau^B))$, i = 1,2, coordination will be strictly 'welfare'-improving for country A if

$$dD^A = \frac{\partial D^A}{\partial \tau^A} d\tau^A + \frac{\partial D^A}{\partial M_i}\left[\frac{\partial M_i}{\partial \tau^A} d\tau^A + \frac{\partial M_i}{\partial \tau^B} d\tau^B\right] > 0 \quad i = 1,2 \tag{3.13}$$

If this expression is evaluated in the Nash-equilibrium, the first and second term on the right hand side of equation (3.13) cancel out. As the external effects, $\frac{\partial D^A}{\partial M_i}\frac{\partial M_i}{\partial \tau^B}$ and

$\frac{\partial D^B}{\partial M_i}\frac{\partial M_i}{\partial \tau^A}$, are both positive in case high-risk workers are mobile, both countries want to coordinate their actions only if the other tax rate is raised compared to the Nash-equilibrium. In case low-risks are mobile, both expressions have a negative sign in the benchmark case. Then, policymakers want to coordinate policies only if the foreign tax rate is lowered. Let us suppose that the countries agree to coordinate their actions, by acting 'as if' they maximise the following welfare function

$$\max_{\tau^A} \quad D^{A'} = D^A + D^B \tag{3.14}$$

Differentiation of equation (3.14) with respect to the own tax rate, and evaluating this expression in the Nash equilibrium gives

$$\frac{dD^{A'}}{d\tau^A} = \frac{\partial D^B}{\partial M_i}\frac{\partial M_i}{\partial \tau^I} \qquad i = 1,2 \tag{3.15}$$

We find that $\frac{dD^{A'}}{d\tau^A}$ is positive if high-risks are mobile and negative if low-risks are mobile. Note, that the latter holds in the benchmark case where $\frac{\partial D^A}{\partial M_1} < 0$ and $\frac{\partial D^B}{\partial M_1} > 0$. For country B similar results hold. Equation (3.15) shows the direction of the change in the tax rates if coordination would occur. According to equation (3.14) the direction of these changes is welfare improving. In both countries policymakers have, thus, an interest in coordinating their social insurance policies. By this coordination arrangement the externalities caused by decentralized decision making are internalized.

In case high-risk workers are mobile, policymakers in country A raise the tax rate in order to lower the number of high-risk workers in country B. In the same way policymakers in country B raise the tax rate, because migration is costly for the migration country. Both tax rates and the benefit rates will be higher when countries coordinate their actions compared to the Nash-equilibrium. We conclude that coordination of social insurance policies prevents a worsening of the system compared with the Nash-equilibrium. So, we have established the result that benefits will be underprovided in a decentralized system of social insurance if the high-risks are mobile. This confirms the results of Gramlich (1985), Brown & Oates (1987), and Wildasin (1991).

Although policymakers have the same motives if low-risks are mobile, the results are reversed in the benchmark case. Policymakers in both countries lower the tax rate to diminish the costs accruing to the other country. In this case there is also tax competition. Contrary to the usual case, tax competition implies here an overprovision of social insurance. Coordination leads to a lower level of social insurance. An interesting case arises if in one country an increase in the number of low-risk workers has a positive effect on political welfare. Then, coordination would imply that in one country the social

insurance level is raised while it is lowered in the other country. Depending on the initial levels of social insurance, divergence of these levels could be the consequence of coordination.

For policy matters it is essential to know the degree of mobility of both groups. According to Greenwood (1975) and Heijke (1987), higher educated are far more mobile than lower educated are. This statement is based on arguments such as the amount of information that higher educated have about labour opportunities abroad, and the quality of these labour opportunities.[12] If we roughly identify higher educated with low-risk workers, migration of low-risk workers is more likely than is migration of high-risk workers. So, in the European Union, coordination of social insurance systems does not necessarily protect the expenditures on social insurance, but it could reduce them if countries do not want to attract low-risk workers.[13] On the other hand, if this last assumption is not valid, coordination could protect the level of social insurance.

Until now, coordination only means that policymakers take account of the welfare effects of their decisions on the other country. The cooperation of the countries could be extended by introducing transfer payments between countries in order to direct the migration flow. Although countries coordinate their decisions, such a question can be politically relevant, if there would arise large one-sided migration flows induced by, for example, structural differences in the economies of the member states. As has been argued above, a system of earmarked grants can only be implemented if both countries gain from it. Such gains can be obtained, because the allocation of the population between the countries is in general not efficient, even when there are no migration costs. In our two-country model it may be Pareto improving if one country gives a grant to the other country, to prevent or stimulate migration.[14] If the migration country pays a grant to the other country, potential migrants have less incentives to migrate because the welfare differential has been diminished.

In our social insurance model the introduction of a grant implies that one country partly finances the social insurance system of the other country. The grant appears on the expenditure side in the budget constraint of the donor country and on the financing side in the constraint of the receiving country. As a consequence, the grant has a direct effect on utility of both groups in the two countries, which implies a change in the

[12]The latter point is also developed by Simon (1990). He argues that in some areas the supply of high-skilled labour is scarce in the EU, especially in technology. Therefore individual firms demand high-skilled workers from other member states, which will increase the mobility of high-skilled workers in Europe.

[13]Of course, coordination is efficient, but that is not the issue here.

[14]See for a more detailed discussion on the efficiency of grants Boadway & Flatters (1982).

preferred tax rates. Moreover, the grant, S, and the concomitant tax change induce a migration flow, so $M_i = M_i(\tau^A, \tau^B, S)$. If we write the political decision-making function as $D^A = D^A(\tau^A, S, M_i(\tau^A, \tau^B, S))$ i = 1,2, the grant is strictly Pareto improving for country A if

$$dD^A = \frac{\partial D^A}{\partial \tau^A} d\tau^A + \frac{\partial D^A}{\partial S} dS + \frac{\partial D^A}{\partial M_i}\left[\frac{\partial M_i}{\partial \tau^A} d\tau^A + \frac{\partial M_i}{\partial \tau^B} d\tau^B + \frac{\partial M_i}{\partial S} dS\right] > 0 \quad i = 1,2 \quad (3.16)$$

Because we are interested in the question of whether a grant will be voluntarily agreed upon by both countries compared with coordination, we evaluate equation (3.16) in the point that the tax rates are optimal according to the welfare function in equation (3.14). So,

$$dD^A = \left[\frac{\partial D^A}{\partial S} + \frac{\partial D^A}{\partial M_i}\frac{\partial M_i}{\partial S}\right] dS + \frac{\partial D^A}{\partial M_i}\frac{\partial M_i}{\partial \tau^B} d\tau^B - \frac{\partial D^B}{\partial M_i}\frac{\partial M_i}{\partial \tau^A} d\tau^A \quad i = 1,2 \quad (3.17)$$

Assuming that the grant is transferred from country A to B, $\frac{\partial D^A}{\partial S}$ has a negative sign and $\frac{\partial D^B}{\partial S}$ a positive one. Because the grant raises welfare in the home country, the migration flow diminishes, so $\frac{\partial M_i}{\partial S} < 0$ for i = 1,2. The expression preceding dS can be positive or negative. The expressions preceding $d\tau^B$ and $d\tau^A$ represent the external effects of decision making on the welfare of the other country. These effects are positive if high-risks are mobile, and negative if low-risks migrate.

For the interpretation of equation (3.17) we take the case that high-risk workers are mobile. Compared with coordination, the introduction of the grants will most probably imply that country A has to increase its tax rate to finance the grant, $d\tau^A > 0$, while country B will be able to decrease its tax rate, $d\tau^B < 0$. It follows that the 'net' external effect for country A, $\frac{\partial D^A}{\partial M_2}\frac{\partial M_2}{\partial \tau^B} d\tau^B - \frac{\partial D^B}{\partial M_2}\frac{\partial M_2}{\partial \tau^A} d\tau^A$, is negative. This negative effect has to be compensated by a positive direct effect of the grant. This effect consists of a positive effect of diminished migration, $\frac{\partial D^A}{\partial M_2}\frac{\partial M_2}{\partial S}$, and a negative effect of transferring this grant, $\frac{\partial D^A}{\partial S}$. In this particular case the diminished migration due to the grant must compensate all the other effects for country A. For country B the reverse reasoning holds. In particular, the change in the tax rates leads to a positive welfare effect, so that the direct effect of the grant can be negative for country B.

The upshot of this discussion is that extending coordination of decision making in a common market by a system of grants need not to be supported unanimously. Although there are benefits in introducing this system, these may not apply to all countries involved. In particular, if the effects of the grant on the migration flow are relatively low, the direct effect of the grant will be negative for country A, as can be seen from

equation (3.17). In that case the receiving country will approve the introduction of a grant system, while the donor country will obviously reject it.

In the analysis above both countries decide on their own contributions to and outlays on the social insurance system. Countries could also decide to integrate their social insurance systems completely, so that contributions and benefit levels are equal in both countries. In that case people have no incentive to migrate if wages are equalized in both countries. The problem is that the individual countries differ from each other in population structure and/or political constellation and/or preferences for social insurance. Given these differences, the policymakers from both countries decide on tax rates that differ from each other in a decentralized system where decisions are coordinated, see equation (3.14). The optimal tax rate in a centralized system cannot fulfil this equation, which implies that a global social insurance system is not efficient compared to coordinated decision making in a decentralized system.

3.6 The Effects of Increasing Integration

Since economic integration in the EU is an ongoing process, it is also important to analyse the effects of removing barriers to labour mobility. The EU measures to ease migration can be represented in the model by decreasing mobility costs. Such changes in costs can be due to policy measures such as the abolition of border control in the Community or the disappearance of the borders altogether in the FRG and the former GDR. On the other hand, information campaigns about job possibilities in other countries and the organisation of exchange programs, are examples of policy measures aimed at lowering the psychological barriers to migration.

The effects of a change in mobility costs can be found by a comparative-static analysis. As is already explained in section 2.6, the results of the partial analysis carry over to the general equilibrium analysis if the slope of country A's reaction curve is dominant. Assuming that this is the case, differentiation of the first-order condition of country A, equation (3.10) to the tax rate and mobility costs gives

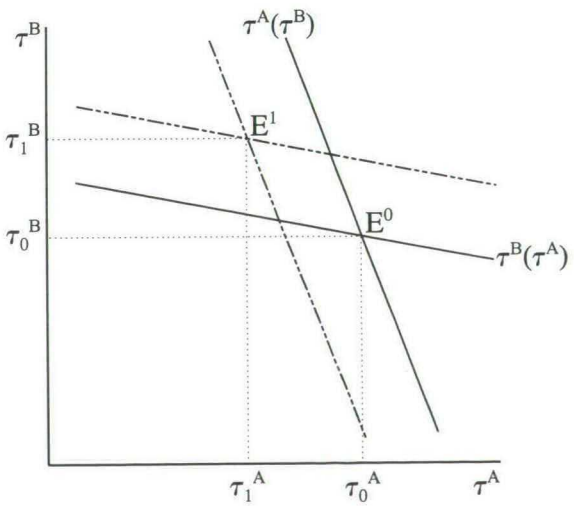
$$\frac{dZ^A}{d\tau^A}d\tau^A + \frac{\partial Z^A}{\partial M_i}\frac{\partial M_i}{\partial C}dC = 0 \qquad i = 1,2 \tag{3.17}$$

$\frac{\partial M_i}{\partial C}$ is determined by differentiating the migration equilibrium, equation (3.7), with respect to the mobility costs. Given the signs of the partial and total derivatives, as

discussed in appendix 3.1, $\frac{\partial Z^A}{\partial M_i}$ is negative (positive) if low-risk (high-risk) workers are mobile. For country B the opposite results are valid. The mobility of both groups is raised if mobility costs are lowered. As a result, if high-risk workers are mobile, the tax rate is raised in the migration country and it is lowered in the home country. If low-risks are mobile, the results are reversed.

The implication of these results will be illustrated for the case that low-risk workers are mobile. Initially, lower mobility costs stimulate migration. As explained in section (3.4), this has several effects on the tax rate. In particular the congestion costs and the benefit level change. Using the assumption made in section (3.4) that the value of the elasticity of the marginal utility of income is sufficiently large, policymakers in the migration country will lower the tax rate, while policymakers in the home country will raise it. This effect is reinforced by the additional migration flow which is incited by the changes in the tax rates in both countries. In the new equilibrium the level of social insurance is lowered in the migration country while it is raised in the home country. An illustration is provided in figure 3.2.

Figure 3.2 The Nash equilibrium and lower migration costs with mobile low-risks



This analysis implies that in case the social insurance tax rate is lower in the migration country than it is in the home country, the systems could diverge from each other. If we translate this result to the case of the EU, it implies that, if the social insurance systems of the southern member states are relatively attractive for the low-risk workers from the northern member states, increasing mobility of this type of workers (due to the process of ongoing integration) could induce a divergence of the levels of social insurance in the EU.

An analogous reasoning can be held for mobility of high-risks workers. This result differs from Brown & Oates (1987). They derive analytically that the benefit level in the migration country is reduced, if the mobility of the poor is increased. For the home country they have no analytical result. In our model decreasing mobility costs imply that the benefit level in the migration country will be increased, while it will be decreased in the home country. This difference occurs,[15] because they assume that $\frac{\partial Z^A}{\partial M_2} < 0$ (in our notation). The sign of this derivative drives their results. In our model $\frac{\partial Z^A}{\partial M_2} < 0$ could only hold if the degree of risk aversion is relatively low.[16] In the partial analysis this assumption leads to the result that the level of social insurance in the migration (home) country is lowered (raised) given the tax rate in the other country. This result also carries over to the two-country analysis as long as the reaction curves are negatively sloped and if the slope of country A's reaction curve is larger in absolute value than is the slope of country B's reaction curve.

Our results concerning the effects of increasing integration may appear a bit surprising. After all one might expect that increasing migration flows would lead policymakers to take measures aimed at restricting these flows. Given the assumptions spelled out in the appendix, this did not turn out to be the case. Actually, our result is driven by the fact that both groups are risk-averse to a sufficiently high degree. So, if the price of the system is increased due to an additional inflow of high-risk workers, both groups prefer to have both the benefit level and the net wage increased rather than a lower benefit level. On the other hand, if the degree of risk aversion is relatively low the congestion effects of increasing integration are relatively more important. Then, policymakers in the migration country could lower the social insurance tax rate to discourage migration. From appendix 3.1 this result shows up if $\frac{\partial Z^A}{\partial M_2} < 0$. This suggests that the model of Brown & Oates is appropriate in case the congestion effects are relatively important

[15] The Brown & Oates model and our model are not directly comparable. Apart from the differences mentioned in the introduction, in their model transfers from the rich are lump-sum instead of multiplicative in wages as in our model, and incomes are exogenous, while in our model wages are endogenous.

[16] Note that it is algebraically not excluded in our model that the second-order condition is satisfied and $\frac{\partial Z^A}{\partial M_2} < 0$.

compared to the degree of risk aversion, for example, caused by low migration barriers or large differences between rich and poor, while our model also covers the mobility case when risk aversion is more important than the congestion costs are.

We are not only interested in the change of the noncoordinated tax rates due to lower migration costs, but also in the change of the desirability of coordination. Due to integration the noncoordinated and coordinated tax rates change, such that the benefits of coordination can be increased or decreased. Therefore we analyse the change in the marginal externality due to integration. The marginal externality, equation (3.15) is differentiated with respect to the mobility costs. This exercise is carried out in appendix 3.2, holding the elasticities constant and using the CRRA properties of the utility function. Below we discuss the cases that low-risk workers and high-risk workers are mobile.

In case low-risk workers are mobile, appendix 3.2 shows that the change in the marginal externality that is faced by the migration country is negative, while it is positive for the home country. In the benchmark case, the marginal externality, $\frac{\partial D^I}{\partial \tau^J}$, is negative (overprovision). Lower mobility costs, thus, raise the costs of the externality that are experienced by the migration country and lowers the one that are experienced by the home country. Because migration is stimulated, the migration country faces larger costs of migration. These costs are further raised by the change in social insurance policy in both countries. The home country raises its tax rate, while the migration country lowers it. As a consequence, the benefits of coordination for the migration country are larger if mobility costs are lower. However, the benefits for the home country are reduced. This diminishes the scope for voluntarily coordination.

In case high-risk workers are mobile, we derive a similar result. The change in the marginal externality that is faced by the migration country is positive, while it is negative for the home country. The marginal externality itself is positive (under-provision). As a result, lower mobility costs raise the costs of the externality that are experienced by the migration country and lowers the one that are experienced by the home country. As with mobile low-risk workers, this is also due to the increase in the migration flow. This increases the migration country's need for coordination, but lowers it for the home country.

3.7 Generalisations of the Model

Some of the assumptions made in the preceding sections were introduced for the sake of simplicity. In particular, this holds for the assumptions that, first, wages are similar for both groups, second, the groups have the same risks of being employed in both countries, and third, for the assumed exogeneity of ξ. This section generalizes these assumptions. This makes our model more applicable, but it is more difficult to obtain analytical solutions. In discussing these assumptions, we concentrate on the consequences for the migration country in case low-risk workers are mobile.

First, we relax the assumption that wages for low and high-risk workers are equal. If we identify low-risk workers with the higher educated and high-risk workers with the lower educated, it is of course more reasonable to assume that the wages of the low-risk workers are higher than are the wages of the high-risk workers. This implies that the price of the system is not equal to the ratio of the non-employed to employed any longer, see equation (3.5), but also depends on the wage rates. We discuss here two extreme cases with different wage rates.

In the first case, we assume that the marginal productivity of labour of each group is influenced by the amount of labour of the other group. We take here the following specific production function, $F(N_1,N_2) = (N_1)^{\beta_1}(N_2)^{\beta_2}$ with N_i representing the employment level of group i. In this specific case the price of the system is not influenced by the migration flow, because the downward effect of extra low-risk workers on the price of the system is completely offset by the lower wage rate of low-risk workers and higher wage rate of high-risk workers. High-risk workers like an increase in the size of the low-risk group, because it has an upward effect on their wage rate, but low-risk workers dislike it for the opposite reason. Consequently, the direction of the change in the tax rate will depend on the value of the marginal wage rates with respect to the migration flow and the relative political power of both groups.

In the other extreme case, marginal labour productivity is independent of the amount of labour of the other group. If the low-risk workers are mobile, their migration implies two effects on the price of the system. The price is lowered because of the increased size of low-risk workers, but it is raised through the lower wage rates of low-risk workers. If the wage function is concave in employment (the third derivative of the production function is positive), the second effect is more than offset by the first effect. Consequently, high-risk workers appreciate the migration flow because the price of the system is lowered, but low-risk workers dislike it, given our assumption about the stability condition. Also in this case, the direction of the change in the tax rate will depend on the political power of both groups.

From both cases we conjecture that the introduction of different wage rates diminishes, first, the effects of migration on the price of the system, and, second, the congestion effects on the labour market, because migration of one group does not threaten the gross wage rate of the other group. However, the qualitative results of our analysis remains unimpaired.

Second, we have restricted the analysis to two groups in each country whose risks are equal in both countries. The analysis could easily be extended to more groups without essentially altering the main results. For example, λ_1 and λ_2 can be interpreted as the risks of being laid off of the groups with lowest and the highest risk and that in between there are a lot of groups with other risks. Decisions are still a compromise between the preferences of all groups and the preferences for the degree of coverage of the risk being laid off are positively related to that risk. Not only the extension of the number of groups in decision making, but also the inflow of workers with risks that do not exist in the migration country can be incorporated in the analysis. Compared with the non-migration case, it follows that for mobile workers with a risk larger than λ_2 every group in the migration country wants to lower the tax rate to discourage their inflow. The analysis is analogous to that of high-risk workers in section 3.3. If mobile workers have a risk is less than λ_1, the tax rate will be increased. These results are analogous to those in section 3.3 if low-risk workers are mobile. However, for mobile workers with a risk between λ_1 and λ_2, the price of the social insurance system can be increased or decreased depending upon the population structure and the risk structure in society. If it increases, the analysis of mobile low-risk workers is applicable, if it decreases the analysis of mobile high-risk workers.

Third, we incorporate endogenous political power in the model. In fact, the exogeneity of ξ contradicts the remarks made in section 3.2 that political power depends on the size of the groups. One might expect that migrants may form pressure groups or even get a right to vote in the long term. An increase in the size of the group increases the number of votes, but probably it also increases the heterogeneity of the group in the sense that in the terminology of Coughlin et al. (1990a) the political bias term is increased. However, assume that the first effect dominates, so that the relative political power of the group depends positively on the relative size of that group. The weights in the policy function are fixed by the electoral process in the past, see section 2.4. This implies that these weights have to be exogenous in the maximisation problem as is argued by Van Winden & Mazza (1994). Although these weights will change in the future (due to another population structure) decisions taken now are based in the actual political constellation. Therefore the weights have to be taken as exogenous now.

Because the political weights change in the future, social insurance policy will also change in the future. The policy chosen now is, thus, not stable in the long run. Van Winden & Mazza (1994) point out that a stable policy can be derived by taking the weights in the maximisation procedure as given, but taking them endogenous in the first-order condition that determines the tax rate. This tax rate depends on the endogenous political weights and is therefore stable with regard to a change in the political weights. So, ξ has to be substituted by $\xi(N_1+M_1, N_2+M_2)$ with $\xi_1>0$ and $\xi_2<0$ in equation (3.10). From section 3.2 we know that the low-risks are the net contributors to the system, and the high-risks the net beneficiaries. If the values of the variables of the Nash equilibrium with fixed weights are substituted in the new first-order conditions, it follows that the migration country lowers the tax rate, and the home country raises the tax rate if low-risks are mobile compared to the situation with fixed weights. If high-risk workers are mobile, the opposite results are valid.

Shortly, from all generalisations made above it follows that the distribution of political power matters in case low-risk workers are mobile. With these generalisations it is not necessarily valid that migration of low-risks workers exerts an upward effect on the level of social insurance. Although the analytical results are less clear with these generalisations, the most important point does not change. The wide-spread opinion that labour mobility will have a downward pressure on social insurance in the EU is not confirmed by our model. Only in case high-risk workers are mobile and mobility costs are fixed, our model supports that opinion definitely.

Another point is that the importance of modelling economic congestion effects raises some questions about the economic structure of the model. Contrary to the facts, capital is immobile in the model. This has consequences for the sensitivity for the wage level to migration flows. If, for example, capital flows have the same direction as migration flows, the downward pressure on wage levels could be (partly) offset by the increase of capital. Even more important is the fact that the capital flow is partly determined by labour costs and therefore by the level of social insurance. As a consequence, the mobility of capital could imply a downward pressure on the level of social insurance. This issue is taken up in the next chapter.

3.8 Conclusions

We have studied different aspects of the influence of labour migration on social insurance policies. Clearly, if labour mobility does occur due to economic integration, this will affect these policies. The results depend on the mobility of the groups and the congestion effects in the economy, especially the labour market. The effects of migration

of high-risk workers correspond with the results in the literature. Migration implies a downward pressure on the levels of the social insurance tax rates and benefits. In examining mobility of the low-risk group, the reaction of the policymakers can depend on the distribution of the political power because migration is considered as a cost by low-risk workers in the migration country, but not necessarily by high-risk workers. In particular, if the latter group is powerful enough, the possibility of labour mobility will have a downward effect on the tax rate. If the low-risk workers are more decisive or both groups in the migration country experience labour mobility as a cost, policymakers raise the tax rates to try to restrict the size of the low-risk group. In this case the possibility of migration could even result in a higher level of social insurance in both countries. Because it is expected that in Europe low-risk workers will be much more mobile than will be high-risk workers and given the existence of congestion costs in most countries, migration will not necessarily worsen social insurance levels, according to our model.

Coordination of decision making on social insurance could (partially) offset the consequences of migration on the level of social insurance. But in a federal system, like the EU, the member states largely maintain their autonomous decision power on social insurance policy. Coordination of decision making can only be implemented if it is unanimously agreed upon by the member states. Such an agreement will certainly be enacted if countries take the welfare effects on the other country into account. If countries face congestion effects due to migration and low-risk workers are mobile, coordination could even lower the tax rates. The coordination of decision making could be extended by transferring a grant between the countries. However, it is an open question of whether there is unanimous consent for grants. It depends on the size of the migration effects relative to the size of the grants. Only if the effects are large, grants will be in the interest of all countries, because then grants can lead to a more favourable population structure.

If the process of economic integration speeds up and mobility costs diminish, the effects depend upon the direction of the net migration flow. In particular, if one country has a comparative advantage in attracting labour ongoing economic integration could imply a divergence of the social insurance systems. So, according to our model the convergence of the social insurance systems is not an inevitable consequence of economic integration. Moreover, the model points out that in the integration process the desirability of coordinating social insurance policies increases for the migration country, and decreases for the home country. Because coordination has to be agreed voluntarily upon, this reduces the probability that coordination will occur.

Appendix 3.1 The Second-Order Derivatives

This appendix presents the second-order derivatives of the policy function and discusses their signs. Given these signs, we can determine the slope of the reaction curves, and the effects of a change in the mobility costs. First, the first-order condition is rewritten using the constant elasticities $\epsilon_{\tau}^{M_i} \equiv \frac{\partial M_i}{\partial \tau}\frac{\tau}{M_i}$ and $\epsilon_N^w \equiv -\frac{\partial w}{\partial N}\frac{N}{w}$, specifying the utility function as $U(x) = x^{1-\sigma}/(1-\sigma)$, and multiplying by τ. σ represents the elasticity of the marginal utility with respect to x. Then, the first-order condition, equation (3.10) reads

$$Z = \delta_1 W_\tau((1-\tau)w)^{1-\sigma} + \delta_2 B_\tau(\eta w)^{1-\sigma} = 0 \qquad W_\tau = -\frac{\tau}{1-\tau} - \epsilon_N^w(1-\lambda_i)\frac{M_i}{N}\epsilon_\tau^{M_i} < 0$$
$$B_\tau = 1 + (\lambda_j - \lambda_i)\frac{(H_j+M_j)}{H-N}(1-\lambda_i)\frac{M_i}{N}\epsilon_\tau^{M_i} - \epsilon_N^w(1-\lambda_i)\frac{M_i}{N}\epsilon_\tau^{M_i} > 0 \qquad i \neq j \tag{A3.1}$$

Note that the wage rate can be eliminated from equation (A3.1). Then, the total derivative with respect to the tax rate is

$$\frac{dZ}{d\tau} = -\delta_1(1-\tau)^{-1-\sigma} + \frac{N-(1-\lambda_i)M_i}{NM_i}\frac{\partial D}{\partial M_i}\left(\frac{\partial M_i}{\partial \tau}\right)^2 + \delta_2(\lambda_i-\lambda_j)\frac{N_j+M_j}{(H-N)^2}\lambda_i(1-\lambda_i)\frac{M_i}{N}\epsilon_\tau^{M_i}\eta^{1-\sigma}\frac{\partial M_i}{\partial \tau}$$
$$- \delta_1(1-\sigma)W_\tau(1-\tau)^{-\sigma} + \delta_2(1-\sigma)B_\tau\gamma\left(1+(\lambda_j-\lambda_i)\frac{H_j+M_j}{H-N}(1-\lambda_i)\frac{M_i}{N}\epsilon_\tau^{M_i}\right)\eta^{-\sigma} \tag{A3.2}$$

If $1-\sigma < 0$, equation (A3.2) has definitely a negative sign. For both groups $\frac{\partial D^A}{\partial M_i} < 0$. If low-risk workers are mobile, all three parts on the first line of equation (A3.2) are negative. Given the assumptions on the degree of risk aversion, and the fact that $W_\tau < 0$, $B_\tau > 0$ the terms on the second line have also a negative sign. If high-risk workers are mobile the third term on the first line is positive. However, it is dominated by the second term on the first line that is negative. So, whether low- or high-risk workers migrate the second-order condition of the maximisation problem is satisfied if $1-\sigma < 0$ (for the migration country).

Equation (A3.2) only represents the second-order derivative for country A. For country B $\frac{\partial D^B}{\partial M_i} > 0$. The first and second term on the first line of equation (A3.2) are positive. Then, $1-\sigma < 0$ is not a sufficient condition for a negative sign. So, the degree of risk aversion has to be larger to satisfy the second-order condition.

The derivative of equation (A3.1) with respect to the migration flow is

$$\frac{\partial Z}{\partial M_i} = \frac{N-(1-\lambda_i)M_i}{M_iN}\frac{\partial D}{\partial M_i}\frac{\partial M_i}{\partial \tau} + \delta_2\gamma(\lambda_i-\lambda_j)\frac{(N_j+M_j)}{(H-N)^2}\lambda_i(1-\lambda_i)\frac{M_i}{N}\epsilon_\tau^{M_i}\eta^{-\sigma} +$$
$$\delta_2(1-\sigma)\frac{dB}{d\tau}\eta^{-\sigma}\frac{\partial \gamma}{\partial M_i} \tag{A3.3}$$

If the low-risk workers migrate, we know that $\frac{\partial D^A}{\partial M_1}\frac{\partial M_1}{\partial \tau^A}>0$, $\epsilon_{\tau}^{M_1}<0$, and $\frac{\partial \gamma^A}{\partial M_1}>0$ in the benchmark case. Assuming that $1-\sigma > 0$, equation (A3.3) has a positive sign. However, if there is much risk aversion such that $\sigma>1$, the sign of equation (A3.3) is not clear. For high degrees of risk aversion it is probably negative. We will consider this as the benchmark case. For country B, the home country, all expressions have the opposite sign, so $\frac{\partial Z^B}{\partial M_1} > 0$. If high-risk workers are mobile, the first and second term in equation (A3.3) have opposite signs. However, the positive sign of the second term is dominated by the negative sign of the first term. For low degrees of risk aversion ($\sigma < 1$), equation (A3.3) has a negative sign. For high degrees of risk aversion the sign will be positive, which will be considered as the most relevant case. For the home country the signs are reversed, so $\frac{\partial Z^B}{\partial M_2} < 0$.

Appendix 3.2 The Change in the Marginal Externality

This appendix derives the effects of a change in the mobility costs on the marginal externality, equation (3.15). Before this equation is differentiated with respect to the mobility costs, it is rewritten using the CRRA specification and elasticities, including the elasticity, $\epsilon_{\tau^B}^{M_i} \equiv \frac{\partial M_i}{\partial \tau^B}\frac{\tau^B}{M_i}$. It follows that

$$\frac{\partial D^A}{\partial \tau^B} = \frac{\partial D^A}{\partial M_i}\frac{M_i}{\tau^B}\epsilon_{\tau^B}^{M_i} = \frac{(1-\lambda_i)}{\tau^B}\frac{M_i}{N}\left(-\delta_1\epsilon_w^N((1-\tau)w)^{1-\sigma} + \delta_2\left(\frac{(\lambda_j-\lambda_i)H_j}{H-N} - \epsilon_w^N\right)(\eta w)^{1-\sigma}\right)\epsilon_{\tau^B}^{M_i} \quad \text{(A3.4)}$$

Assuming that the elasticities are constant, differentiation of equation (A3.4) gives

$$\begin{aligned}\frac{\partial^2 D^A}{\partial \tau^B \partial C} = \frac{\partial^2 D^A}{\partial \tau^B \partial M_i}\frac{\partial M_i}{\partial C} = \Bigg[&\frac{N+(1-\lambda_i)M_i}{N}\frac{\partial D^A}{\partial M_i} + (1-\lambda_i)\frac{M_i}{N}\delta_2\frac{(\lambda_i-\lambda_j)H_j}{(H-N)^2}\lambda_j(\eta w)^{1-\sigma} + \\ &(1-\lambda_i)^2\frac{M_i^2}{N^2}(1-\sigma)\left(\delta_1\epsilon_w^{N\,2}((1-\tau)w)^{1-\sigma} + \delta_2\left(\epsilon_w^N + \frac{(\lambda_i-\lambda_j)H_j}{H-N}\right)^2(\eta w)^{1-\sigma}\right)\Bigg]\frac{\epsilon_{\tau^B}^{M_i}}{\tau^B}\frac{\partial M_i}{\partial C}\end{aligned} \quad \text{(A3.5)}$$

The sign of the whole term in brackets in equation (A3.5) is negative for country A whether low or high risks are mobile. In the benchmark case $\frac{\partial D^A}{\partial M_i} < 0$ for both risk groups. So, the first term succeeding the equality sign is negative. The second term is also negative if the high-risks migrate. For the low-risks it is positive, but dominated by the first term. The term on the second row is negative if $1-\sigma < 0$. Moreover, lower migration costs increase the mobility of both groups, and $\epsilon_{\tau^B}^{M_1} > 0$ and $\epsilon_{\tau^B}^{M_2} < 0$. If low-risk workers are mobile equation (A3.5) has a positive sign, while the sign is negative if high-risk workers are the mobile ones.

The change in the marginal externality that the home country faces is not so clear as can be seen by inspecting equation (A3.5). Then, the combination of the first two terms in brackets have a positive sign ($\frac{\partial D^B}{\partial M_i} > 0$), while the third term has a negative sign. If the degree of risk aversion is large enough, the latter term dominates the combination of the other two. Also for country B the sign of the term in brackets is negative. Because the elasticities of migration with respect to the tax rate have the opposite sign, $\frac{\partial^2 D^B}{\partial \tau^A \partial C}$ is negative if low-risks are mobile and positive if the high-risks are mobile.

Chapter 4

Capital Mobility and Wage Bargaining[1]

4.1 Introduction

This chapter examines the consequences of the integration of capital markets in an economic union on decentralized social insurance policies. In view of the fact that nearly no labour mobility is observed between EU member states, one often concludes that local redistribution policies will not be affected by tax competition pressures. In this chapter, we argue that this conclusion is not correct if labour unions succeed in shifting tax contributions to capital owners. Then, social insurance contributions affect the profitability of investment. This effect could be substantial, taking into account the size of social insurance contributions in the EU.

This chapter combines social insurance policy, wage bargaining and capital mobility in a two-country world. Compared to the standard fiscal federalism models, the model contains several elements that are new or seldom used in this area. First, we introduce a two-country model with an integrated capital market in which the rate of return on capital is assumed to be endogenous. Capital markets are not perfectly integrated because there are extra costs in investing abroad (see also Persson & Tabellini, 1992). Second, a new element is the introduction of an endogenous social insurance system which offers a benefit to non-employed workers. Benefits are financed by a tax on wage income. Third, by the introduction of wage bargaining (another new element in the model) decentralized labour unions shift these tax contributions to employers in the form of higher wages. Due to this mechanism, the employee-based tax on wage income acts like an indirect source-based tax on capital income. This has a negative effect on the rate of return on capital, and the amount of investment in a country.

Furthermore, workers and capital owners have a say in determining social insurance policies. Because the tax rate affects the rate of return on capital negatively, capital owners' utility is negatively affected by the mere existence of a social insurance system. Workers benefit from a social insurance system because every worker has a positive (endogenous) chance of getting non-employed. Given this set up, we compare the case with capital mobility to that of autarky. The model shows that capital mobility reduces capital owners' opposition to the system, because domestic capital owners will be able to avoid tax contributions for the social insurance system by investing abroad, and domestic capital owners will try to mitigate capital inflow by increasing the coverage of the social insurance system. Workers prefer lower taxes because a larger capital stock

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[1]This chapter is nearly identical to Lejour & Verbon (1995a).

has a positive effect on the wage rate. It will turn out that in the present model the last effect dominates. Thus the introduction of capital mobility leads countries to lower the social insurance tax rates.

A similar difference between the preferences of workers and capital owners also shows up if we compare decentralized social insurance policies with coordinated social insurance policies. If countries do not take account of the effects on foreign welfare, workers prefer inefficiently low tax rates in order to attract capital compared to the case in which social insurance policies are coordinated, while capital owners prefer inefficiently high tax rates in order to mitigate the capital inflow. The model shows that there will be underprovision of social insurance. This result is due to the characteristics of wage-bargaining and the production function in the model.

This chapter distinguishes between capital-importing and exporting countries, and introduces mobility costs. The latter characteristic allows us to consider the effects of increasing economic integration as a result of decreasing mobility costs. These effects will appear to depend upon the degree of risk aversion in the utility function. Risk aversion determines the reaction of the demand for social insurance to a change in welfare engendered by ongoing economic integration. It follows that capital-importing and -exporting countries react differently to increasing capital mobility. It will be seen that, dependent on the initial size of the social insurance systems and the degree of risk aversion, economic integration does not necessarily imply a convergence of social insurance systems.

Section 4.2 introduces the characteristics of the model: wage-bargaining, social insurance, capital mobility, behaviour of the firms, and decision-making. The subsequent section analyses the decision-making process and the relation between social insurance tax rates and capital mobility. The results of coordinated and noncoordinated fiscal policy will be compared in section 4.4. Section 4.5 examines the effects of increasing integration. The last section summarizes the main results, and qualifies briefly the model.

4.2 Labour Unions, Social Insurance, and Capital Mobility

This section presents the set up of the model. The main ingredients of the model consist of the wage-bargaining structure, the social insurance system, capital mobility, behaviour of the firms, and the decision-making function. All these characteristics of the model are discussed below.

4.2.1 Labour unions

We assume that wage formation is based on wage-bargaining by labour unions with firms at a decentralized level in both countries of our two-country model. The labour markets in the EU member states are characterised by high and persistent unemployment rates and real wage rigidity. 75% of all workers' wages are covered by collective bargaining, which mostly takes place at the firm or industry level. Layard et al. (1991) provide an overview of these facts, and argue that the rigidity on labour markets can be largely explained by wage bargaining.

Unions are interested in maximising the utility of their members. Assuming that labour unions set unilaterally wages they maximise[2]

$$\Omega_i = \overline{L}_i \left[\frac{L_i}{\overline{L}_i} U((1-\tau)w_i) + \frac{\overline{L}_i - L_i}{\overline{L}_i} E(U_l) \right] \tag{4.1}$$

with respect to the gross wage w_i.[3] $\overline{L}_i$ represents the exogenous number of union members, and L_i the number of members that is employed in firm i. τ represents the social insurance tax rate. So, $L_i/\overline{L}_i$ represents the probability of being employed in firm i, and receiving the net wage $(1-\tau)w_i$, and its counter part $(\overline{L}_i - L_i)/L_i$ the probability of not being employed in firm i. Finally, $E(U_l)$ is the expected utility of union members that are not employed in firm i. They work elsewhere or are not employed and receive a benefit. Expected utility of the outside option is defined by

$$E(U_l) = \frac{N}{H} U((1-\tau)w) + \frac{H-N}{H} U(\eta w) \tag{4.2}$$

$\frac{N}{H}$ represents the macroeconomic probability of being employed, and $\frac{H-N}{H}$ the probability of being non-employed. For a union member that is not employed in firm i, the probability of finding another job equals, thus, the macroeconomic probability of being employed. ηw is the benefit that non-employed workers receive, and is related to the average wage, w. It is assumed that workers fully consume their income. $U(\ )$ represents the utility of labour or benefit income. The utility function belongs to the class of constant relative risk aversion, $U(x) = x^{1-\sigma}/(1-\sigma)$. σ (>0) represents the elasticity of

[2]To avoid confusion, we do not indicate that the variables in the equations are country-specific. Later on we will use the superscript I to refer to country I, etc.

[3]Note, that we ignore the threatpoint of unions as is common in Nash bargaining functions. Assuming that the threatpoint equals $E(U_l)$ would not change any of the results, see also Layard et al. (1991).

the marginal utility with respect to income, and equals the degree of risk aversion. The degree of risk aversion will be one of the driving forces of social insurance in our model.

The unions are assumed to be so small that their policies do not affect significantly the macroeconomic employment level and the benefit level. In maximising their objective function, equation (4.1), unions take into account that labour demand is a function of gross wages. It is assumed the unions regard the investment decisions of firms as predetermined, and not to be influenced by wage bargaining. If the first-order condition is multiplied by $-w_i/L_i$, it follows that

$$\epsilon_i\big(U((1-\tau)w_i) - E(U_l)\big) - (1-\tau)w_i U'((1-\tau)w_i) = 0 \tag{4.3}$$

where ϵ_i is defined by $-\frac{\partial w_i}{\partial L_i}\frac{L_i}{w_i}$. Because $\epsilon_i > 1$, which is e.g. the case if labour demand is derived from a standard Cobb-Douglas production function, equation (4.3) implies that the net wage is positively related to expected utility of the outside option. Using the CRRA specification of the utility function, it follows that the utility of the net wage exceeds expected utility, i.e. $U((1-\tau)w) > E(U_l)$.

Assuming that all firms and labour unions are identical, the wage in firm i equals the average wage, $w_i = w \;\forall\; i$, and $\epsilon_i = \epsilon \;\forall\; i$. Inserting this condition and the specification of the utility function in equation (4.3), and multiplying with $w^{\sigma-1}$ we get the following macroeconomic relation between the tax rate, benefit rate and the employment level.

$$(1-\tau)^{1-\sigma}\left(1 - \frac{(1-\sigma)H}{\epsilon(H-N)}\right) - \eta^{1-\sigma} = 0 \tag{4.4}$$

The wage is eliminated from equation (4.4), because the benefit is proportional to the average wage at a macro-economic level. Layard et al. (1991) derive a similar result if benefits are proportional to wages. This proportionality depends purely on the assumption that the social insurance tax rate is proportional to the gross wage. Notice that, although unions seem only to determine the wages implicitly at a macro-economic level by determining the level of employment, this is not the case at a micro level, as can be seen in equation (4.3). Note, that independent of the sign of $1-\sigma$ equation (4.4) implies that $1-\tau > \eta$. The net wage, thus, exceeds the benefit level which implies that the social insurance system is incentive compatible.

4.2.2 Social insurance

Social insurance contributions are assumed to be fully paid by workers. However, labour unions will shift workers' social insurance contributions to employers by setting

higher wages. The social insurance contributions are equal to τw for every employed worker. Every worker who becomes jobless as a consequence of illness, disability, unemployment, or old age receives a benefit, ηw. The budget equation of the social insurance system reads

$$\begin{aligned} & \tau wN = \eta w(H-N) \\ \Rightarrow \quad & \eta = \tau\gamma \qquad\qquad \gamma \equiv \frac{N}{H-N} \end{aligned} \tag{4.5}$$

where N represents the number of employed workers and $H-N$ the number of non-employed. We assume that the total number of workers, whether employed or not, H, is exogenous and that employment is endogenously determined by wage-bargaining and labour demand. It follows that the risk of being non-employed is endogenous on a macroeconomic level.[4] Note that the inverse of the workers-beneficiaries ratio, $\frac{1}{\gamma}$, can be interpreted as the price of the social insurance system.

Inserting the budget restriction, equation (4.5) into equation (4.4), gives a relation between the tax rate and the employment level. The relation between those two variables is negative, $\frac{\partial N}{\partial \tau} < 0$. The reason is that increases in the tax rate have a positive effect on expected utility of the outside option,[5] and improve therefore the bargaining position of unions; see equation (4.3). As a result, wages will be pushed up, which has a negative effect on employment. By this mechanism social insurance taxes are shifted from workers to employers.

4.2.3 Capital mobility

Assume that the employers own capital; from now on they will be referred to as capital owners. Capital owners maximise their utility, U_c, by maximising their net return on capital. In both countries, each capital owner possesses a fixed endowment of one unit, which cannot be sold. Given that $\overline{K}$ indicates the number of employers, the total fixed endowment in a country is equal to $\overline{K}$. In our two-country model with capital mobility, capital owners can invest their endowment in one or both countries. The investment decision depends on the returns on capital in both countries, r^I. A capital owner from country B invests in country A if

[4]Although the risk of becoming ill or disabled is partly determined by medical causes, and so from an economic point of view this risk is exogenous, economic circumstances determine the risk of being non-employed and the effort of employers to attract partially disabled. For the sake of simplicity, this chapter abstracts from the exogenous risk.

[5]If this relation would be negative workers would like lower tax rates. As we will see in section 4.3 employers also prefer lower taxes. In that situation there does not exist a positive tax rate.

$$r^A > r^B + C \tag{4.6}$$

C represents the costs of investing abroad. Persson and Tabellini (1992) call it 'mobility costs'. These consist of costs of gathering extra information about legal issues or about marketing, of overcoming country-specific regulations, of hiring foreign employees, and, most important, of gathering information to judge the profitability of investment possibilities and the solvency of firms. The fact that this information is not easily obtainable from abroad makes foreign investors reluctant to invest abroad, see also Gordon & Bovenberg (1994). The elimination of all formal restrictions to capital mobility in the EU is, thus, not a sufficient condition for international capital mobility. Molle (1990) argues that capital markets have to become more transparent by informing investors and creditors about the quality of financial products to make the liberalization of capital markets effective.

One expects that capital mobility will increase in coming years. According to the White book (CEC, 1985), a lot of country-specific rules will be standardized, and the European Commission is working on a harmonization of company laws. This will improve the transparency of capital markets. We will represent the further integration of capital markets by lowering the parameter C in our model, as will be done in section 4.5. To simplify the analysis, we consider only capital flows from country B to A. Capital owners in country A invest, thus, their endowment completely in their own country, while capital owners in country B may choose to invest in both countries.[6]

Given the initial situation that the difference between the returns on capital in country A and B outweighs the mobility costs, capital flows to country A, which leads to a decrease in r^A and an increase in r^B, due to the change in the marginal productivity of capital in both countries. We assume that there exists an internal equilibrium such that

$$r^A = r^B + C \tag{4.7}$$

[6]We have simply assumed that mobility costs are constant per unit of foreign investment. Persson & Tabellini (1992) use a more complicated function to model the mobility costs. In the first place, they assume that the mobility costs are convex in the size of the investment abroad. They need this assumption to get an internal equilibrium because, contrary to our model, the gross rates of return on capital are exogenous. In the second place, their function allows for bidirectional capital flows. We could also use such a function for the mobility costs here, but that does not alter the main results in sections 4.3 and 4.4. However, we use such a function in chapter 7 for the reasons just mentioned.

4.2.4 Firms' behaviour

In both countries there is one consumer good produced, with capital and labour as inputs. The production function, $F(N,K)$, is characterised by constant returns to scale, so there are no profits. Assuming that the prices on the factor markets are given for individual firms, the demand for both inputs is determined by their prices. It follows that

$$F_K(N,K) = r \tag{4.8}$$

$$F_N(N,K) = w \tag{4.9}$$

The subscripts refer to the first-order derivatives of the production function with respect to capital and labour. Total demand for capital, $K^A + K^B$, is equal to the exogenous supply of capital by the capital owners, $\overline{K} = \overline{K^A} + \overline{K^B}$. The rate of return on capital depends on the capital stock in each country.[7]

Given the budget restriction of the social insurance system, the wage-bargaining equation, the marginal products of capital, the capital arbitrage condition, and exogenous capital supply, we consider the effects of changes in the tax rates and mobility costs on the capital stock in both countries. First, the marginal product of capital, equation (4.8), is substituted in the arbitrage condition, equation (4.7), for both countries. Second, equation (4.4), in which the budget restriction, $\eta = \tau\gamma$, is substituted, is substituted in the arbitrage condition, to eliminate employment from this equation. Third, by substituting the equilibrium condition for the capital market, $\overline{K} = \overline{K_A} + \overline{K_B}$, and differentiating the arbitrage condition with respect to capital, the tax rates and the mobility costs, it follows quite easily that

$$\frac{\partial K^I}{\partial \tau^I}, \frac{\partial K^A}{\partial C} < 0, \quad \frac{\partial K^I}{\partial \tau^J}, \frac{\partial K^B}{\partial C} > 0 \qquad \text{with} \quad \text{I,J} = \text{A,B} \quad \text{I} \neq \text{J} \tag{4.10}$$

Substituting these results in equation (4.8) and (4.9) gives

[7]The total mobility costs, $C(K^A - \overline{K^A})$, are paid to lawyers, consultants, etc., who spend this income on consumption. They have no influence on the social insurance policy, because they are self-employed, and have their own private insurance. In addition, the size of the group is too small and their interests are too heterogenous, to form a relevant interest group in the decision-making process on social insurance.

$$\frac{\partial r^I}{\partial \tau^H}, \frac{\partial r^B}{\partial C} < 0, \quad \frac{\partial r^A}{\partial C} > 0 \qquad \text{with} \quad I,H = A,B \tag{4.11}$$

$$\frac{\partial w^A}{\partial C} < 0, \quad \frac{\partial w^B}{\partial C}, \frac{\partial w^I}{\partial \tau^H} > 0 \qquad \text{with} \quad I,H = A,B \tag{4.12}$$

These results are not surprising. A decrease in employment resulting from an increase in the country's own tax rate has an adverse effect on the marginal product of capital. As a result, the return on capital decreases, and capital flows to the other country. Although the lower capital stock has a depressing effect on the marginal product of labour, equation (4.9), this effect is dominated by the upward effect of lower employment on the marginal product of labour. So, higher taxes do indeed lead to higher wages. Due to the specification of wage bargaining, foreign employment is not affected by the change in the tax rate. Because of the increase in the capital stock there, foreign wages do also rise. An increase in the tax rate exerts, thus, an upward effect on wages and a downward effect on the return on capital in both countries. The explanation of the derivatives with respect to the mobility costs is postponed to section 4.5.

4.2.5 Social insurance policy

Finally, we endogenise the social insurance system. Decisions on social insurance policy are made by politicians/policymakers. Because politicians want to be in office their (proposed) policies are restricted to maximise their expected majority in the elections. Using a probabilistic voting model, Coughlin et al. (1990a) have shown that in such a case the decision-making function has the following form:[8]

$$D(E(U_l),U_c) = \xi HE(U_l) + \overline{K}U_c \tag{4.13}$$

Because politicians embrace policies that maximise voters' (expected) utility, the decision-making function is a weighted average of the expected utility of workers, $E(U_l)$, and residing capital owners, U_c. The exogenous weight ξ refers to the relative political influence of workers. D could also be interpreted as a weighted social welfare function. If $\xi = 1$, it is an utilitarian one.

[8]See section 2.4 for more details.

4.3 Optimal Social Insurance Policy for One Country

This section derives the optimal social insurance tax rate for one country, and compares it with the tax rate that results if capital is immobile. The analysis of the Nash-equilibrium, and the comparison with the cooperative equilibrium, are carried out in section 4.4.

In studying fiscal equilibria in two-country models, it is quite natural to assume that noncooperative policymakers take the fiscal decisions of the other country as given. These fiscal equilibria are characterised as Nash-equilibria. In addition, the fiscal decisions of the policymakers affect the private sector at home and abroad. It is assumed that policymakers take these effects into account in optimising the decision-making function, while the private agents take the announced policy decisions as given.

In particular, politicians take account of the macroeconomic consequences of wage bargaining reflected by equation (4.4). If this equation is substituted in the decision-making function, equation (4.13), workers' expected utility reduces to an expression that only contains the utility of net wages, so $D = D(\tau, w, r)$. Differentiating equation (4.13) with respect to the social insurance tax rate we get the following first-order condition[9]

$$Z \equiv \frac{dD}{d\tau} = \xi H \delta \frac{d((1-\tau)w)}{d\tau} U'((1-\tau)w) + \bar{K} \frac{\partial r}{\partial \tau} U'(r) = 0$$
$$\delta \equiv 1 - \frac{1-\sigma}{\epsilon} > 0 \qquad \text{if} \quad \epsilon > 1 \tag{4.14}$$

The first term on the right-hand side of the equality sign represents the effects of a change in the tax rate on workers' expected utility. From equation (4.3) it follows that if workers' expected utility, $E(U_l)$, rises due to a tax increase, labour unions are able to demand higher net wages, so, $\frac{d((1-\tau)w)}{d\tau} > 0$. The second term on the right-hand side represents the effect on capital owners' utility. This effect is negative, because the increase in the tax rate has a negative effect on the rate of return on capital. Note that if an increase in the tax rate did not improve workers' expected utility and consequently lower the net wage, $Z < 0$. So, the optimal tax rate would be negative. However, this possibility is ruled out in the sequel.

Given that $\frac{d((1-\tau)w)}{d\tau} > 0$ and the fact that CRRA utility functions satisfy the Inada conditions, the optimal tax rate is positive. It is lower than the preferred one by the workers, because it has a negative effect on the welfare of capital owners. As a result,

[9]Appendix 4.1 proves that the second-order condition for maximisation is satisfied assuming constant elasticities for the derivatives of the wage and return on capital with respect to the tax rate.

an increase in the relative political influence of the workers will exert an upward effect on the tax rate, while an increase in the relative influence of the capital owners will exert the opposite effect.

Besides comparing the cases that social insurance policies are internationally coordinated or not (see section 4.4), we also analyse the effects of international capital mobility on the level of social insurance compared to the case in which capital is immobile, and is completely invested in the home country. This is labelled as the nonmobility case. As is discussed in section 2.5, we make the comparison with capital mobility at the point that there is no foreign investment, so $K^I = \overline{K^I}$ in each country. The size of the capital stock and employment level are similar in both cases. Notice, however, that this comparison holds only if the arbitrage condition, equation (4.7), also happens to hold in the nonmobility case. Our comparison is, thus, really one where, if in an autarkic economy the borders are opened hypothetically, the level of economic activity remains initially the same as under autarky. The politicians, however, take account of the arbitrage condition. Then, the influence of capital mobility appears from the derivatives of the net wage and the return on capital with respect to the tax rate, denoted by $\frac{\partial w^m}{\partial \tau}$ and $\frac{\partial r^m}{\partial \tau}$, compared with those in the nonmobility case, $\frac{\partial w^n}{\partial \tau}$ and $\frac{\partial r^n}{\partial \tau}$.

The effect of capital mobility on the tax rate is analysed by evaluating the first derivative of the decision-making function, at the point where capital is not mobile. In fact, we substitute the first-order condition for the case in which capital is not mobile in equation (4.14). The effect of capital mobility follows from the sign of the expression below

$$V^m \equiv Z^m - Z^n = \xi H \delta (1-\tau) U'((1-\tau)w)\left[\frac{\partial w^m}{\partial \tau} - \frac{\partial w^n}{\partial \tau}\right] + \overline{K} U'(r)\left[\frac{\partial r^m}{\partial \tau} - \frac{\partial r^n}{\partial \tau}\right] \quad (4.15)$$

In particular, if $V^m < 0$, policymakers decide on a lower tax rate if capital has become mobile. The first term on the right-hand side is negative. It is in the interest of workers to lower the tax rate if capital becomes mobile, because the positive effect of an increase in the tax rate on wages will be reduced. If capital is mobile, capital will flow away, due to the lower marginal product of capital. This affects the marginal product of labour negatively, and consequently reduces the upward pressure of an increase in the tax rate and wages. Since this effect does not exist in the nonmobility case, the absolute value of $\frac{\partial w^m}{\partial \tau}$ is smaller.

The second term is positive. With the introduction of capital mobility, capital owners get better opportunities to invest, thereby increasing the return on investment. The marginal costs of an increase in the tax rate decrease, because taxes can be escaped by

investing abroad. Although capital owners still prefer no social insurance system, their opposition against the system is reduced.[10]

From looking at the preferences of workers and capital owners, we can thus conclude that with the introduction of capital mobility the conflict between workers and capital owners is diminished. The total effect of the introduction of capital mobility can be derived by some substitutions that are carried out in appendix 4.2. As a result

$$V^m = \xi H \delta w U'((1-\tau)w)\left[\frac{\partial r^m}{\partial \tau}\left(\frac{\partial r^n}{\partial \tau}\right)^{-1} - 1\right] < 0 \qquad (4.16)$$

This result is due to the characteristics of the decision-making function and the production function, in particular the constant-returns-to-scale assumption. So, starting from autarky the introduction of capital mobility implies that politicians lower the social insurance tax rate in order to keep wages and employment high by trying to prevent an outflow of capital or to attract capital. This policy has a negative effect on the return on capital, but the harmful welfare effects on capital owners are offset by the beneficial welfare effects for workers.

4.4 The Noncoordinated and Coordinated Equilibrium

4.4.1 The noncoordinated equilibrium

Thus far, we have studied only the optimal tax rate for one country given the foreign tax rate. This section analyses the fiscal Nash-equilibrium. We compare it with the coordinated equilibrium to consider the question of whether the member states use the social insurance tax strategically to influence the capital flows. Such strategic behaviour of the member states could lead to an underprovision of social insurance.

First, we analyse the reactions of policymakers to changes in the foreign tax rate. To this end, the first-order condition, equation (4.14), is rewritten by substituting the elasticities $\epsilon_\tau^w = \frac{\partial w}{\partial \tau}\frac{\tau}{w}$ and $\epsilon_\tau^r = -\frac{\partial r}{\partial \tau}\frac{\tau}{r}$. Because the home tax rate cannot be explicitly written as a function of the foreign tax rate, we differentiate the first-order condition to obtain the slopes of the reaction curves, and assume that the mentioned elasticities are constant. As a result

[10]This result seems to be surprising because, especially in the northern member states of the EU, employers argue that the level of social insurance must be lowered, due to the economic integration. However, the arguments of the employers are based mainly on the idea that European integration increases competition between the firms on the consumer goods market. Chapters 5 and 6 examine this issue.

$$\frac{dZ^I}{d\tau^I}d\tau^I + \frac{dZ^I}{d\tau^J}d\tau^J = 0 \qquad I \neq J \quad I,J = A,B$$

$$\frac{\partial Z^I}{\partial \tau^J} = \frac{(1-\sigma)}{\tau^I}\left(\xi H \delta\left(-\tau + (1-\tau)\epsilon_\tau^w\right)U'((1-\tau)w)\frac{\partial w^I}{\partial \tau^J} - \overline{K}\epsilon_\tau^r U'(r)\frac{\partial r^I}{\partial \tau^J}\right) \tag{4.17}$$

Equation (4.17) describes the reaction of the tax rate to a change of the foreign tax rate. $\frac{dZ^I}{d\tau^I}$ represents the second-order condition of maximisation of the policy function, and has a negative sign. $\frac{dZ^I}{d\tau^J}$ indicates the effect of a change of the foreign tax rate on the marginal utility with respect to the home tax rate. This effect on the home country is induced by the change in the capital flow, which has an effect on gross wages and the return on capital. Because the gross wage is raised and the return on capital is lowered by an increase of capital (due to a higher foreign tax rate), the expression in brackets has a positive sign. So, the sign of $\frac{dZ^I}{d\tau^J}$ depends positively on the sign of $1-\sigma$.

The sign of $1-\sigma$ depends on the relative importance of the effects on marginal utility relative to the effects on utility. In particular, if $1-\sigma < 0$, the negative effects of an increase in labour income on its marginal utility dominate the positive effect on utility. The same holds for the effect of an increase in the return on capital for capital owners. An increase in the foreign tax rate, leading to higher gross wages and a lower return on capital, will then lead to less demand for social insurance, $\frac{dZ^I}{d\tau^J} < 0$. The reaction functions of both countries have a negative slope in that case.

By the same token if $1-\sigma > 0$, the negative effect of a change in income on its marginal utility is less important. Then, the positive effects of higher wages and a lower return on capital on utility dominates. It follows that workers and capital owners prefer at the margin more social insurance in reaction to an increase in the foreign tax rate, $\frac{dZ^I}{d\tau^J} > 0$. The reaction functions of both countries have a positive slope.

Because the absolute value of the slope of country A's reaction curve is larger than the one of country B is in absolute value,[11] it follows that there is one Nash equilibrium irrespective of the sign of $1-\sigma$. In addition, we know that the social insurance tax rates in the fiscal Nash-equilibrium are lower than in the nonmobility case, because capital mobility exerts a downward pressure on the social insurance tax rates as is discussed in section 4.3.

[11] This claim can be proved by comparing $\frac{\partial Z^I}{\partial \tau^J}$ from equation (4.17) with $\frac{\partial Z^I}{\partial \tau^I}$. If the countries differ not much, it follows that the value of the latter derivative dominates. If $1-\sigma < 0$, this is immediately clear. If $1-\sigma > 0$ it must be noted that the negative term in $\frac{\partial Z^I}{\partial \tau^I}$ is at least twice as large as the positive terms. In a dynamic setting, this result would imply that the equilibrium is stable.

4.4.2 The coordinated equilibrium

As is well known, noncooperative behaviour under the Nash-equilibrium is in general not efficient due to the external effects of decision making. Member states do not take into account the beneficial or harmful effects that accrue to the other member states due to the increase of their own tax rate, as discussed in section 1.4. These fiscal externalities could be corrected if the countries were to coordinate decision making on social insurance. By the term 'coordination' we mean to imply the situation in which countries decide autonomously on the level of social insurance, but in a mutual action with the other members of the economic union set their tax rates such that the reciprocal external effects are effectively taken into account. This issue is especially relevant for the situation in the EU. Given the absence of a central authority, the externalities can be internalized only if the countries voluntarily coordinate their decisions. Coordination must, thus, be 'welfare' improving for all countries involved. That is to say

$$dD^I = \xi H \delta U'((1-\tau)w^I)\left[\frac{d(1-\tau)w^I}{d\tau^I}d\tau^I + \frac{\partial(1-\tau)w^I}{\partial\tau^J}d\tau^J\right] + \overline{K}U'(r)\left[\frac{\partial r^I}{\partial\tau^I}d\tau^I + \frac{\partial r^I}{\partial\tau^J}d\tau^J\right] > 0 \qquad I,J = A,B \quad I \neq J \tag{4.18}$$

If this expression is evaluated at the Nash-equilibrium, i.e. $Z^I = 0$, it follows from equation (4.18) that countries wants to coordinate decision making if it holds that

$$dD^I = \left[\xi H \delta U'((1-\tau)w)(1-\tau)\frac{\partial w^I}{\partial\tau^J} + \overline{K}U'(r)\frac{\partial r^I}{\partial\tau^J}\right]d\tau^J > 0 \tag{4.19}$$

$$I \neq J, \qquad I,J = A,B$$

As before, workers and capital owners have different ideas about the desired change in the foreign tax rate.[12] Workers prefer an increase in the foreign tax rate, because that attracts capital and exerts an upward effect on wages in their country, while capital owners prefer a decrease because that improves their opportunities abroad. As in the previous section, this ambiguity can be solved by substituting the first-order condition, equation (4.14), in equation (4.19) to eliminate the influence of capital owners. Because of the relation between the derivatives of wages and the return on capital with respect to both tax rates, the resulting expression can be simplified to

[12]The signs of the derivatives above are determined in section 4.2.

$$\frac{dD^I}{d\tau^J} = \frac{\partial r^I}{\partial \tau^J}\left(\frac{\partial r^I}{\partial \tau^I}\right)^{-1} \xi H \delta w U'((1-\tau)w) > 0 \qquad I \neq J,\ I,J = A,B \tag{4.20}$$

This is a similar condition to equation (4.16). It says that member states are willing to coordinate their decisions if other member states are willing to raise social insurance rates. It appears from maximising $D^A + D^B$ with respect to both tax rates, i.e. the Pareto-optimal solution, that coordination leads to higher tax rates than these are in the Nash equilibrium. So, coordination is indeed welfare improving. The tax rates are higher because countries take account of the negative externality on other countries. An increase in foreign tax rates would stimulate capital inflow and exerts an upward effect on wages. This positive external welfare effect through wages dominates the negative external effect through a lower return on capital. The former externality is quite common in the fiscal federalism literature; see Wilson (1986), Zodrow & Mieszkowski (1986), and Wildasin (1989). The latter externality does not appear very often, because in most models the price of capital is fixed by assuming one large capital market.

We obtain the familiar result that, when countries do not coordinate decision making, tax competition will lead to underprovision. Normally, tax competition is defined as the case where countries compete to attract the mobile good by manipulating the tax rate on that good (see Wildasin (1988)). Interestingly, in this case the relation between the tax rate (on labour) and the mobile good (capital) is indirect. The result is based on the link between the capital market and the distorted labour market. In the first place, the size of the capital stock determines partly the wage level and therefore the tax base of the social insurance system. In the second place, as the tax contributions are shifted to capital owners the social insurance tax rate acts as an indirect source-based tax on capital. Consequently, also in this case a change in the tax rate distorts the tax base through the induced mobility effects.[13]

4.5 The Effects of Increasing Capital Mobility

Since economic integration in the EU is an ongoing process, it is important to analyse the consequences of removing the remaining barriers to capital mobility, and the initiatives of the EU Commission to make capital markets more transparent for foreign

[13]Bucovetsky & Wilson (1991) derive a similar result. In analyzing tax competition they conclude from their model that jurisdictions use a lump-sum tax on wage income as an instrument to attract capital.

investors. The measures in this area can be represented in the model by lowering the mobility costs. Such changes in costs can be due to several policy measures, for example by lifting or standardizing country-specific rules that restrict the mobility of capital, as the harmonization of company laws, or by starting campaigns to inform potential foreign investors about investment policies.[14]

We consider the effect of a change in the mobility costs on the social insurance tax rate in one country by differentiating the first-order condition, equation (4.14), with respect to the tax rate and the mobility costs, given the foreign tax rate. Also in this case the elasticities are assumed to be constant.

$$\frac{dZ^I}{d\tau^I}d\tau^I + \frac{dZ^I}{dC}dC = 0 \qquad I = A,B$$

$$\frac{dZ^I}{dC} = \frac{(1-\sigma)}{\tau^I}\left(\xi H\delta\left(-\tau+(1-\tau)\epsilon_\tau^w\right)U'((1-\tau)w)\frac{\partial w^I}{\partial C} - \overline{K}\epsilon_\tau^r U'(r)\frac{\partial r}{\partial C}\right) \tag{4.21}$$

$\frac{dZ^I}{dC}$ represents the total effect of a change in the mobility costs on the marginal welfare with respect to the tax rate. Because lower mobility costs increase the capital inflow in country A, it exerts an upward effect on the wages and a downward effect on the return on capital in that country. This implies that the term in brackets in equation (4.21) has a positive sign. Country B is the capital-exporting country, so there are opposite effects on wages and the return on capital. As a result, the effects of lower mobility costs on the tax rates are not identical in both countries. The sign of the effects depends on the sign of $1-\sigma$.

If $1-\sigma < 0$ the negative effects on the marginal utility with respect to income are more important than the positive effects on utility due to an increase in income. Lower mobility costs imply a larger capital stock, and consequently higher wages and a lower return on capital in the capital-importing country. This leads to less demand for social insurance in the capital-importing country. Thus, the tax rate and the benefit rate decrease. By the same reasoning, it follows that the tax rate in the capital-exporting country is increased. If the sign of $1-\sigma$ is reversed, the opposite results hold. For the case that the utility is specified as a logarithmic function a change in mobility costs does not have any effect on the tax rates.

[14]It is assumed that the reduction of the mobility costs is part of an agreement between the member states to complete the internal market. It is expected that this agreement is beneficial to all member states involved, although the reduction of mobility costs in itself is not necessarily beneficial to all of them. In particular, there is a negative welfare effect of lower mobility costs for the capital-exporting country.

Because the absolute value of the slope of country A's reaction curve is larger than is the one of country B, it follows that the results in the partial equilibria carry over to the fiscal Nash-equilibrium. So, $\frac{d\tau^A}{dC} > 0$ and $\frac{d\tau^B}{dC} < 0$ if $1-\sigma < 0$. This case is depicted in figure 4.1a. A decrease in mobility costs shifts the negatively-sloped reaction curves of country A and B to the left and above, respectively. Workers and capital owners in the capital-importing country are less willing to pay social insurance contributions, while both groups in the capital exporting country want to raise social insurance contributions in comparison with the old equilibrium, E^0.

Whether these asymmetric results imply convergence or divergence of both social insurance systems depends on the initial situation. If the attractiveness of the capital-importing country for investors is based on the lower level of social insurance tax rates, increasing integration will imply a divergence of the level of social insurance between capital-importing and capital-exporting countries. However, if $1-\sigma > 0$, this will lead to a convergence of the social insurance tax rates. This case is depicted in figure 4.1b.

A reduction in the mobility costs also has an asymmetric effect on the externalities of noncoordinated behaviour of the member states. This can be seen by differentiating $Z^{I\prime} = \frac{dD^I}{d\tau^J}$ (see equation (4.19)) with respect to the mobility costs, in which the constant elasticities $\epsilon_\tau^{w\prime} = \frac{\partial w^I}{\partial \tau^J}\frac{\tau^J}{w^I}$ and $\epsilon_\tau^{r\prime} = -\frac{\partial r^I}{\partial \tau^J}\frac{\tau^J}{r^I}$ are substituted. It follows that

$$\frac{dZ^{I\prime}}{dC} = \frac{(1-\sigma)}{\tau^J}\left[\xi H \delta U'((1-\tau)w)\epsilon_\tau^{w\prime}(1-\tau)\frac{\partial w^I}{\partial C} - \bar{K}U'(r)\epsilon_\tau^{r\prime}\frac{\partial r^I}{\partial C}\right] \qquad (4.22)$$

$$I \neq J,\ I,J = A,B$$

Using inequalities (4.11) and (4.12) it follows that $\frac{dZ^{B\prime}}{dC} < 0$, and $\frac{dZ^{A\prime}}{dC} > 0$, if $1-\sigma < 0$. A reduction in mobility costs will, thus, imply that changes in country A's tax rate will have a larger effect on welfare in country B than it has before the reduction in mobility costs. On the other hand, $\frac{dZ^{A\prime}}{dC} > 0$, implies that an increase in the tax rate of country B has less effect on the welfare of country A than it has before the cost reduction. Thus, the capital-exporting country (B) seems to face more harmful effects from tax competition if the integration process proceeds, while for the capital-importing country (A) the reverse holds. In other words, the process of increasing integration, typified by lower barriers to capital mobility, will lead to more gains from coordination for the capital-exporting country and it will lead to less gains for the capital- importing country.

The results above are reversed if $1-\sigma > 0$. Then, the capital-importing country faces more harmful effects from tax competition, and the capital-exporting country faces less harmful effects. Now it becomes more beneficial for the capital-importing country to coordinate social insurance policies.

Figure 4.1a The Nash equilibrium and increasing capital mobility with $1-\sigma < 0$

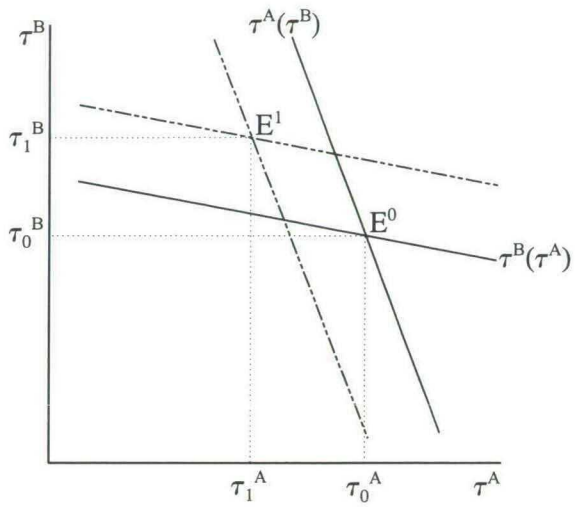
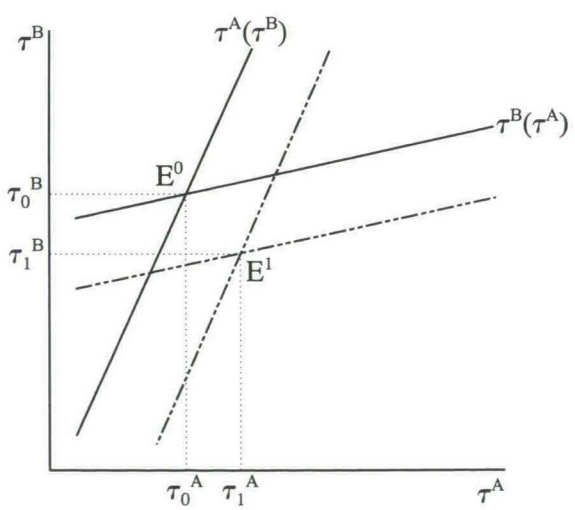


Figure 4.1b The Nash equilibrium and increasing capital mobility with $1-\sigma > 0$



4.6 Conclusions

In this chapter we have considered the effect of capital mobility on decision making concerning social insurance systems in an economic union. It was assumed that social insurance is financed by worker-based taxes that can be shifted to employers by wage bargaining. The existence of a social insurance system, then, affects the wage rate, and the rate of return on capital. Changes in the rates of return incite a capital flow between the member countries.

Decisions about the tax rate or, what amounts to the same thing, the benefit rate were represented as a compromise between employers/capital owners and workers. Whether or not capital is mobile, workers want a higher benefit rate than do capital owners. However, the difference in the preferred level diminishes if capital is mobile. The reason for this is that workers want to reduce the tax rate to attract capital with the aim of raising wages, while, on the other hand, the effects of the tax rate on the rate of return on capital are dampened because capital owners have obtained the opportunity to invest abroad. Our two-country model shows that the tax rates in the Nash equilibrium are below the levels that prevail in the nonmobility case.

In our model the externalities of autonomous decision making consist of the effects of the home tax rate on the foreign wage rate and the foreign marginal product of capital. In particular, if the tax rate is increased in one country, the wage rate in the other country will increase but the rate of return on capital in the other country will decrease. In other words, the workers gain but the capital owners in the other country lose as a consequence of the increased tax rate. The net effect on welfare is positive, however. Then, voluntary coordination of social insurance policies where member states of an economic union change their policies in a mutual action to realise a welfare gain, implies higher tax rates. This type of coordination does protect the level of social insurance against social dumping.

It was shown that increasing economic integration, leading to more capital mobility, exerts a downward effect on the tax rate in the capital-importing country and an upward effect in the capital-exporting country for a high degree of risk aversion. If, in that case, the capital-importing countries are also the ones with the lowest level of social insurance, as is the case for the southern member states of the EU, increasing economic integration could imply a divergence of social insurance systems. Furthermore, capital-importing countries have less reason to coordinate social insurance policies, because their benefits from the coordination of social insurance policies are inversely related to the progress of the integration process. For a low degree of risk aversion the reversed result holds. Then, the levels of social insurance can converge due to economic integration.

It can be noted here that the conflicting interests between workers and capital owners as represented in equation (4.13) is not the only interpretation of our model. More generally, we described the interests of the owners of a mobile endowment, and of an immobile endowment in social insurance policies. In particular, the owners of the immobile endowment have an interest in policies that attract the mobile endowment, while the owners of the mobile endowment want to prevent crowding. This implies that the owners of the immobile endowment want to restrict the social insurance system, and that the owners of the mobile endowment have less objections against the system compared to the case that both endowments are immobile.

Moreover, mobility is not necessarily associated with the ownership in (physical) capital. One may argue that employers cannot move their fixed physical capital easily to other countries,[15] and, second, that workers save a part of their income and have access to the international capital market, through e.g. pension funds.[16] In that case workers own also a part of the mobile capital endowment. The conflict between employers and workers is, then, less severe than in the case of our model in which only employers own the mobile endowment capital, and workers the immobile endowment labour.

[15]This is another reason, in addition to the one mentioned in footnote 10, why employers plea for a lower level of social insurance in an integrated market.

[16]If individuals own a mobile and an immobile endowment, the composition of their income is also a determining element in the decision-making process. In a median voter model, in which individuals have different ratios of capital income to labour income, analogous results can be obtained as here, where this ratio has the same role as political power in our model.

Appendix 4.1 The Sign of the Second-Order Derivatives

This appendix derives the second-order derivative of the maximisation problem discussed in section 4.3. For simplicity, we introduce elasticities in the first-order condition that are assumed to be constant. These elasticities are $\epsilon_\tau^w = \frac{\partial w}{\partial \tau}\frac{\tau}{w}$ (> 0) and $\epsilon_\tau^r = -\frac{\partial r}{\partial \tau}\frac{\tau}{r}$ (> 0). The rewritten first-order condition, equation (4.14) reads

$$\tau Z = \xi H \delta \left(-\frac{\tau}{1-\tau} + \epsilon_\tau^w \right) ((1-\tau)w)^{1-\sigma} - \overline{K} \epsilon_\tau^r r^{1-\sigma} = 0 \tag{A4.1}$$

This equation is differentiated with respect to the tax rate, assuming that the elasticities are constant.

$$\frac{dZ}{d\tau} = -\frac{\xi H \delta}{(1-\tau)^2}((1-\tau)w)^{1-\sigma} + \frac{(1-\sigma)}{\tau}\xi H \delta \left(\frac{-\tau}{1-\tau} + \epsilon_\tau^w \right)^2 ((1-\tau)w)^{1-\sigma} + \frac{(1-\sigma)}{\tau}\overline{K}(\epsilon_\tau^r)^2 r^{1-\sigma} \tag{A4.2}$$

It follows immediately from equation (A4.2) that the second-order derivative is negative if $1-\sigma < 0$. It can also be shown that the second-order condition is negative if $\sigma \in (0,1)$. This is more complicated. First, equation (A4.2) is rewritten by substituting the first-order condition to eliminate the terms pertaining to capital owners. As a result,

$$\frac{dZ}{d\tau} = -\frac{\xi H \delta}{(1-\tau)^2}((1-\tau)w)^{1-\sigma} + \frac{(1-\sigma)}{\tau}\xi H \delta \left(\frac{-\tau}{1-\tau} + \epsilon_\tau^w \right)\left(\frac{-\tau}{1-\tau} + \epsilon_\tau^w + \epsilon_\tau^r \right)((1-\tau)w)^{1-\sigma} \tag{A4.3}$$

Second, we show that the two terms in brackets are smaller than $\frac{1}{1-\tau}$. Then, it follows easily that the negative term dominates. Equation (A4.3) has, thus, a negative sign. This claim is proved by writing out the elasticities. Hereby we use the explicit expressions for the derivatives of wages and the return on capital with respect to the tax rate, that were derived in section 4.2. It is assumed that the production function is of the Cobb-Douglas type with $-\frac{\partial w}{\partial N}\frac{N}{w} = (1-\alpha)$ and $-\frac{\partial r}{\partial K}\frac{K}{r} = \alpha$. It follows that

$$\epsilon_\tau^w = (1-\alpha)\epsilon_\tau^N R, \qquad \epsilon_\tau^r = \alpha \epsilon_\tau^N R \qquad \epsilon_\tau^N \equiv -\frac{\partial N}{\partial \tau}\frac{\tau}{N} \qquad R \equiv 1 - \frac{r^A K^A}{r^A K^A + r^B K^B} \tag{A4.4}$$

The variable R enters equation (A4.4), because the wage and the return on capital depend on the capital stock and employment. If countries are 'identical', it follows that $R = 1/2$. Using the explicit expression for the derivative of employment with respect to the tax rate (equation 4.4) it follows that

$$\epsilon_\tau^N < \frac{H-N}{(1-\tau)H} \tag{A4.5}$$

Substituting the results of equation (A4.4) and (A4.5) in the terms in brackets of equation (A4.3) it follows that these terms are indeed smaller than $\frac{1}{1-\tau}$. The second-order condition of the maximisation problem is, thus, satisfied.

Appendix 4.2 Capital Mobility versus Autarky

Section 4.3 derives equation (4.16) by substituting the first-order condition in the nonmobility case and rewriting some derivatives of wages and the return on capital with respect to tax rates in equation (4.15). This appendix describes these substitutions in more detail. Given equation (4.15), we derive first the differences in the derivatives in the mobility and nonmobility case.

$$\frac{\partial w^m}{\partial \tau} - \frac{\partial w^n}{\partial \tau} = F_{NN}\frac{\partial N}{\partial \tau} + F_{NK}\frac{\partial K}{\partial \tau} - F_{NN}\frac{\partial N}{\partial \tau} = F_{NK}\frac{\partial K}{\partial \tau} < 0 \tag{A4.6}$$

$$\frac{\partial r^m}{\partial \tau} - \frac{\partial r^n}{\partial \tau} = F_{KN}\frac{\partial N}{\partial \tau} + F_{KK}\frac{\partial K}{\partial \tau} - F_{KN}\frac{\partial N}{\partial \tau} = F_{KK}\frac{\partial K}{\partial \tau} > 0 \tag{A4.7}$$

After substituting equation (A4.6) and (A4.7) in equation (4.15) the first-order condition for the nonmobility case is substituted for $\bar{K}U'(r)$. Equation (4.15) becomes

$$V^m = \xi H \delta U'((1-\tau)w)(1-\tau)\left[F_{NK} - \frac{F_{KK}F_{NN}\frac{\partial N}{\partial \tau}}{F_{KN}\frac{\partial N}{\partial \tau}}\right]\frac{\partial K}{\partial \tau} + \xi H \delta U'((1-\tau)w)w\left(\frac{\partial r^m}{\partial \tau}\left(\frac{\partial r^n}{\partial \tau}\right)^{-1} - 1\right) \tag{A4.8}$$

Due to the constant-returns-to-scale assumption of the production function, the value of the Hessian is zero, so the first term on the right-hand side of equation (A4.8) vanishes. The second term is the expression in equation (4.16).

Chapter 5

The Completion of the Internal Market[1]

5.1 Introduction

This chapter discusses the effects of the integration of consumer goods markets in an economic union. In 1985 the EU member states decided to reduce and eliminate nearly all trade barriers for the completion of the internal market. Although at that time most import tariffs and quantity restrictions were officially abolished, there still existed a lot of non-tariff barriers, such as physical frontiers (custom regulations), technical frontiers including the discrimination of foreign bids for public purchases, and fiscal frontiers; see also section 1.2. Once, these barriers were introduced to protect and stimulate industries and employment at home. With the acceptance of the Internal Market Programme a lot of these instruments are indeed eliminated, but the incentive of policymakers to protect their home industries still exists, however. Policymakers can even be under more pressure to take protective or stimulative measures, because competition is intensified by the internal market programme.

This could imply that EU member states will use or intensify the use of other policy instruments to improve employment and competitiveness of their industries. Except for changes in tax and investment policies, countries could adapt their social insurance policies. These policies are an important instrument in that respect, given the size of the social insurance system (see table 1.1) and the fact that member states are still autonomous in that policy area. Because the huge social insurance contributions are an important labour cost factor, especially in the northern member states, producers plea for lower social insurance taxes. For that reason the use of social insurance taxes as a competitive policy instrument can exert a downward effect on the level of social insurance in the member states.

However, the completion of the internal market induces also some effects that (partly) offset the downward pressure on the size of the social insurance budgets. Although the increasing competition on consumer goods markets has some threats, especially for the import sector, the opportunities for the export sector will improve. Besides, lower trade barriers, and a better exploitation of economies of scale could exert a downward effect on prices, which stimulates production and employment. This broadens the tax base for social insurance contributions, and could have a positive effect on the benefit levels. In addition, lower prices enlarge the scope to increase taxes in order to tax (implicitly)

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[1]This chapter is nearly identical to Lejour (1995b).

foreign consumers that buy import goods more heavily. This exerts an upward effect on the tax rate.

This chapter analyses the opposing effects of the integration of consumer goods markets on social insurance policies. We develop a two-country model that is based on three strands in the literature: first, the literature on imperfect competition, increasing returns and trade (see Smith & Venables (1988) among others), second, the literature on labour market rigidities and the like (see Layard et al. (1991)), and third, the fiscal federalism literature on interregional externalities and trade (see Arnott & Grieson (1981), Mintz & Tulkens (1986), Wilson (1987), and Wildasin (1993)).

Imperfect competition is introduced to cover the effects of the changes in trade barriers and social insurance policies on competitiveness of firms and adjustments in the industries. By the assumptions that firms set their own prices, and that there are fixed costs in production, firms will obtain profits if the number of firms is fixed in the short term. Adjustments in the industries will take place in the long term by entry and exit of firms. The results will show that the distinction between the short and long term can be crucial for the results.

Labour market rigidities are introduced to represent the fact that social insurance contributions whether they are paid by workers or producers exert an upward effect on labour costs and thereby on consumer prices. As a result, competitiveness and trade are affected by social insurance policies. For simplicity we assume that worker-based social insurance contributions exert an upward effect on wages. It can be the consequence of wage bargaining between labour unions and firms.

In addition, this chapter is one in the field of the literature on fiscal federalism and trade. In that literature there is in general a tax on capital or production, see section 1.4. Fiscal policy causes externalities, because it exerts an upward effect on consumer prices, and thereby creating terms-of-trade effects. Sometimes, fiscal policy also affects the tax base in the other countries. Both externalities will also appear here. This chapter deviates from that literature because here we examine the role of labour taxes in an economic union with integrated consumer goods markets. Moreover, we consider the effects of lower trade barriers.

Using our two-country model we analyse whether member states can use the social insurance tax rates as a competitive policy instrument, and its effect on the tax rates compared to the case that social insurance policies are coordinated. The chapter will show that tax competition leads to an overprovision of the level of social insurance in the short run. This is due to the dominance of the terms-of-trade effect over the comparative-advantage effect. The latter effect represents the incentive of countries to

set low tax rates in order to stimulate production, employment, real wages and real profits. We also show that the overprovision result does not necessarily hold if there is free entry and exit. Entry and exit exert a downward pressure on the average price level and thereby reducing the terms-of-trade effect relative to the comparative-advantage effect. In particular, if the degree of substitutability between home-produced and foreign-produced goods is high, and wages are sensitive for changes in employment, the comparative-advantage effect tends to dominate the positive terms-of-trade effect. Then, there is underprovision of social insurance.

In the second part of the chapter the effects of the internal market programme on social insurance are analyzed by a decrease in the exogenous trade barriers. It shows that the effect of further integration has a downward effect on social insurance levels in the long run whether taxes are determined in a coordinated way or not. However, this chapter does not conclude whether this leads to an increase in tax competition between the countries. That issue will be discussed in chapter 6. That chapter uses a linear model in which redistributive and tariff policy are endogenously determined. That framework permits us to draw conclusions with respect to changes in the degree of tax competition due to integration of consumer goods markets.

Section 5.2 presents the analytical framework to examine the relationship between consumer good mobility and social insurance policy. The social insurance model is based on chapter 2 in which producers and workers both have a say in the policy decisions on social insurance. For the modelling of production and trade we use the imperfect competition model of Dixit & Stiglitz (1977), which is extended for integrated economies by Smith & Venables (1988). In the next section we analyze social insurance policy in a member state, and the Nash equilibrium is analyzed in section 5.4. The results of coordinated and noncoordinated social insurance policies are compared in section 5.5 to answer the question of whether tax competition emerges. Section 5.6 examines the effects of a reduction of the trade barriers on the level social insurance. The last section summarizes the main results and qualifies the model.

5.2 The Social Insurance Model and Trade

This section presents, first, the modelling of the social insurance system and decision-making. Second, we present the model of imperfect competition with economies of scale and trade, based on Smith & Venables (1988).

5.2.1 Decision making on social insurance

Social insurance contributions are an important labour cost factor for employers, because of the employer-based social insurance taxes, and the fact that workers try to shift their social insurance contributions to employers in wage negotiations. In the model we assume that the workers pay all social insurance contributions, but that a part of these contributions is passed on to employers by wage bargaining. These contributions are τw for every employed worker, where τ represents the social insurance tax rate and w the nominal gross wage. Every worker who becomes jobless, as a consequence of illness, disability or unemployment, receives a benefit, ηw, where η represents the benefit rate. The budget equation of the social insurance system in a country reads[2]

$$\tau wN = \eta w(H-N) \quad \Rightarrow \quad \eta = \tau\gamma \quad \gamma \equiv \frac{N}{H-N} \tag{5.1}$$

where N represents the number of employed workers and $H-N$ the number of beneficiaries. It is assumed that the size of the labour force, H, is exogenous, and that the employment level is endogenously determined by profit maximisation. It follows that the risk of being non-employed is endogenous on a macroeconomic level.[3] Note that the reverse of the workers-beneficiaries ratio, $\frac{1}{\gamma}$, can be interpreted as the price of the social insurance system.

Workers have a chance, $\frac{N}{H}$, of being employed and a chance, $\frac{H-N}{H}$, of being non-employed. Dependent on their state of employment they receive labour or benefit income. The expected (indirect) utility of a representative worker in a country is equal to

$$E(U_l) = \frac{N}{H}U((1-\tau)\omega) + \frac{H-N}{H}U(\eta\omega) \qquad \omega = w/p \tag{5.2}$$

It is assumed that workers fully consume their real income. ω and p represent the real wage, and the average price level, respectively. The latter variable will be defined in equation (5.5). $U(\ )$ represents the utility of real income whether one is employed or non-employed. The utility function is twice continuously differentiable, increasing, strictly concave and it satisfies the Inada conditions. These assumptions imply that

[2]As long as it is not confusing, we do not indicate that variables are country-specific. Later on, we use superscripts to refer to countries. Then only equations for country A are presented as those for country B have a similar structure.

[3]Although the risk of being ill or disabled is partly determined by medical causes, so from an economic point of view this risk is exogenous, economic circumstances determine the risk of being non-employed, the effort of employers to attract partially disabled, and the like. For simplicity we abstract from the exogenous risk.

workers are risk averse. If there is a positive chance to be non-employed, workers are prepared to pay social insurance taxes in order to obtain a benefit if one is non-employed. For the analysis of the second-order conditions it will be assumed that the utility function is of the CRRA type.

The income source of producers is nominal profit. Increases in production costs, such as an increase in gross wages will have a negative effect on profits. They derive utility from real profits, so $U_c = U(\pi_i/p)$. Because the utility of workers and producers are affected by the system, both groups try to influence social insurance policy. The interests of both groups are represented in the following decision-making function

$$D = \xi HE(U_l) + nU_c \tag{5.3}$$

The decision-making function is a representation of the politically weighted utilities of workers and producers. The parameter ξ represents the relative political power of workers. Note, that if ξ equals 1, equation (5.3) represents a standard social welfare function. n indicates the number of producers.[4]

5.2.2 Imperfect competition, increasing returns, and trade

Workers, employed or non-employed, and producers spend their whole income on consumer goods. These goods are differentiated goods, whether produced in their own or the foreign country. All individuals try to maximise their direct utility, $U(x)$, given their budget, $I = px$. x represents the index of differentiated consumer goods, which is defined as

$$x^A \equiv (n^T)^{\frac{\theta-1}{\theta}} \left(\sum_{i=1}^{n^A} x_i^{A\,\theta} + \sum_{j=n^A+1}^{n^T} x_j^{A\,\theta} \right)^{\frac{1}{\theta}} \qquad 0<\theta\leq 1 \tag{5.4}$$

n^T denotes the total number of firms in both countries together. It is used in equation (5.4) for normalization. The parameter θ represents the degree of substitutability between the differentiated goods. x_j^A is the amount of consumer good j that consumed in country A with the associated producer price p_j^A.[5] The price index is defined as

[4]Note that if the number of firms is variable due to free entry and exit, profits tend to become negligible. Then, producers have no political influence. If the number of producers is fixed, profits are assumed to be positive. Then, governments take account of producers' interests.

[5]The index used in the subscripts refers to the country of origin of the consumer good.

$$p^A \equiv n^{T\frac{1}{b-1}} \left(\sum_{i=1}^{n^A} p_i^{A\,1-b} + \sum_{j=n^A+1}^{n^T} p_j^A (1+t)^{1-b} \right)^{\frac{1}{1-b}} \qquad b \equiv \frac{1}{1-\theta} \tag{5.5}$$

t denotes the trade costs to export goods, which are included in the consumer prices. We assume that the trade costs are identical for all imported consumer goods whether they are produced in country A or B. These costs consist mainly of trade-barrier costs, and transportation costs. The multiplicative term including the number of firms normalizes the price index. We obtain the demand for the home- and foreign-produced goods by solving the consumer maximisation problem. As individual income is linear in the demand functions, it is easy to aggregate them

$$x_i^A = \frac{I^A}{p^A n^T} \left(\frac{p_i^A}{p^A} \right)^{-b} \quad i = 1,...,n^A \qquad x_j^A = \frac{I^A}{p^A n^T} \left(\frac{p_j^A (1+t)}{p^A} \right)^{-b} \quad j = n^A + 1,...,n^T \tag{5.6}$$

As in most models on imperfect competition, total nominal income in a country, I, is assumed to be given. This can be motivated by using an imperfect competition model as in Blanchard & Fischer (1989), in which consumers also derive utility from holding money balances. Then, total nominal income is proportional to exogenous money supply. This relation underlies the short-cut used here.[6]

Producers of differentiated goods set prices taking into account consumer demand. It is assumed that each firm produces one variety that is sold at home and abroad. Due to market segmentation and market power producer prices can differ in these markets. Labour is the only production factor, so all production costs are labour costs. Real profits of firm i in country A equal

$$\frac{\pi_i^A}{p^A} = \frac{p_i^A x_i^A}{p^A} + \frac{p_i^B x_i^B}{p^A} - \omega^A L_i^A \qquad i = 1,...,n^A \tag{5.7}$$

In the long term profits vanish because of entry and exit of firms. The condition, $\pi_i = 0$ determines the (endogenous) number of firms in a country. L_i^A represents the size of employment in firm i in country A. Total employment in country A is equal to

[6]By using this short-cut instead of money in the utility function in a two-country model, we neglect the effects of changes in tax rates on aggregate nominal income within a country. These effects do exist, although the effects on nominal income in both countries together is zero. By taking into account these effects the conclusion that there is underprovision of social insurance would be strengthened.

$$N^A = \sum_{i=1}^{n^A} L_i^A = n^A c_0 + c \sum_{i=1}^{n^A} (x_i^A + x_i^B) \tag{5.8}$$

c_0 and c represent fixed and constant marginal costs, respectively. This specification of the cost function is introduced by Krugman (1979) to allow for decreasing average costs. It is the most simple way to represent economies of scale in the model.

Producers maximise their profits by setting the optimal prices. Because there are many producers it is assumed that producers do not take account of the effect of their price decisions on the aggregate price level. Of course, producers do take into account the change in the demand for their goods. As a result, it follows that

$$p_i^A = p_i^B = \frac{b}{b-1} cw \qquad i = 1,...,n^A \tag{5.9}$$

Because their are many producers they have no market power. This implies that their prices do not depend on their market shares, but only on marginal costs and the mark up. Producer prices at home and abroad are, thus, similar. The ratio $\frac{b}{b-1}$ determines monopoly profits. A higher degree of substitutability increases competition, and therefore reduces monopoly profits.

In most EU countries wages are determined by bargaining between firms and labour unions at decentralized levels (industry or firm level), see Layard et al. (1991). Wage bargaining is, however, not modelled here. Although it would give a nice underpinning of the determination of wages, the complexity of the model would increase substantially, without adding much to its main point: the analysis of tax competition in (imperfectly) integrated consumer goods markets.[7] For that reason we assume that the real wage is a function of employment and the tax rate as in most wage-bargaining models. This assumption implies that nominal wages are fully indexed to the price level, and permits no nominal wage rigidity. Because high tax rates reduce the net wage and increase the benefits and thereby increasing the bargaining power of labour unions, it will be assumed that the relation between the real wage and the tax rate is positive. High employment levels do also improve the bargaining position of labour unions, because,

[7]As can be seen in chapter 4, an explicit wage-bargaining structure affects also the choice for the social insurance system. Due to the distortionary effects of taxation induced by trade, the reasons for social insurance could disappear in a simple setting. As a consequence, the model has to be extended by introducing more elements that sustain a social insurance system, such as a group of beneficiaries who do not participate in the labour force. The model is not extended in this way, because the increasing complexity of the model cannot be justified by the additional benefits to our view.

first, labour is more scarce for firms, and, second, it lowers the price of the social insurance system, and thereby also improving the opportunities for the workers outside the firm. Summarizing

$$\omega = \omega(\tau, N), \qquad \omega_\tau \equiv \frac{\partial \omega}{\partial \tau} > 0, \qquad \omega_N \equiv \frac{\partial \omega}{\partial N} > 0 \tag{5.10}$$

5.3 Social Insurance Policy in One Country

In this section we analyze the optimal social insurance tax rate for one country in the short and long term, respectively. The succeeding section analyzes the Nash equilibrium. Note, that the only decision variable for policymakers is the tax rate. The benefit level follows from substitution of the tax rate and employment level in the budget restriction, equation (5.1).

Taking all information about the private sector into account the policymakers maximise the decision-making function, equation (5.3), in which the budget constraint is substituted, given the economic sub-model. So, $D = D(\tau, N, \omega, \pi/p)$.[8] We differentiate this function with respect to the tax rate, taking into account the effects on employment, wages, and real profits.[9] In the long term profits vanish, and are therefore not relevant in the long-term analysis.

The effects of a change in the tax rate on the economic variables are derived by differentiating the economic sub-model with respect to all endogenous variables, see appendix 5.1. In the short term, an increase in country A's tax rate has an upward pressure on real wages in country A. Producers will raise their nominal prices which exerts an upward effect on the average price levels in country A and B. Due to the indexation of nominal wages, this causes upward effects on nominal wages and prices. The increase in the general price level reduces real income, so consumer demand will be lower, and production and employment will be contracted in the union as a whole. Due to the increase in country A's tax rate, the increase in producer prices of firms located in country A is relatively larger than is the one of the producers located in country B. As a result, employment and production in country A is contracted. The decline in employ-

[8]The economic sub-model consists of 16 equations in which producer prices, general price levels, demand for home and foreign goods, employment, real wages and profits or the number or firms are determined, see equations (5.5) to (5.10).

[9]From now on, it is assumed that producers i and j are the representative producers of country A and B, respectively.

ment weakens the bargaining position of unions. However, the initial rise in the real wage is dominant, so the real wage increases in spite of less employment. The increase in competitiveness of firms in country B causes an upward effect on production and employment. However, due to the loss of consumer purchase power induced by higher prices, production and employment in country B also diminish, and the real wage is reduced. Profits shrink in country B as is also the case in country A.

In the long term, if there is free entry and exit, the loss in competitiveness due to higher taxes, causes a reduction in the number of firms in country A, and increases the number of firms abroad. This contracts employment at home even more. In addition, the upward effect of higher prices on the price level is very modest, because firms that produced more expensively have left the industry (country A), while firms that produce more cheaply (due to lower labour costs) enter the industry (country B). Opposed to the results in the short term it is possible that the real wage will be pushed down in country A. This depends on the size of the loss in production and employment which is in its turn depends on the degree of substitution of home and foreign goods, θ, and the effect of a change in employment on the real wage, ω_N. Appendix 5.1 proves that, if $\frac{\theta\,\omega_N N}{(1-\theta)\omega} > 1$, the loss in employment and its effect on the real wage is so large that the real wage will indeed be pushed down. Due to the substitution from more expensive goods produced in country A to cheaper goods produced in country B, production and employment in country B will increase. Because the upward effect of the increase in country A's tax rate on prices is modest now (opposite to the short term) the increase in production, employment, and profits is not completely offset by less consumer purchase power if the inequality above is met.

Differentiating the welfare function with respect to the tax rate, the first-order condition reads[10]

$$Z \equiv \frac{dD}{d\tau} = \xi(U((1-\tau)\omega) - U(\eta\omega))N_\tau + \xi N\frac{d((1-\tau)\omega))}{d\tau}U'((1-\tau)\omega) + \xi(H-N)\frac{d\eta\omega}{d\tau}U'(\eta\omega) + n\frac{d(\pi_i/p)}{d\tau}U'(\pi_i/p) = 0 \tag{5.11}$$

$$\frac{d((1-\tau)\omega)}{d\tau} \equiv -\omega + (1-\tau)(\omega_\tau + \omega_N N_\tau) < 0 \qquad N_\tau \equiv \frac{\partial N}{\partial \tau} < 0$$

[10]Appendix 5.2 derives the second-order condition of the maximisation problem. Note, that the interests of those who profit from tariff revenues are not represented in this analysis.

$$\frac{d\eta\omega}{d\tau} \equiv \gamma\omega + \tau\gamma_N N_\tau \omega + \eta(\omega_\tau + \omega_N N_\tau) > 0 \qquad \gamma_N = \frac{H}{(H-N)^2}$$
$$\frac{d(\pi_i/p)}{d\tau} \equiv \frac{\pi_i}{p\omega}(\omega_\tau + \omega_N N_\tau) + \frac{c\omega}{b-1} N_\tau < 0 \tag{5.12}$$

The discussion of the first-order condition is split into the cases that the number of firms is fixed and that there is free entry and exit. In the first case, the first-order condition is the one in equation (5.11). The first three effects represents the effects of a change in the tax rate on workers' expected utility. The first term represents the negative effect of an increase in the tax rate on employment, and thereby on the probability of finding a job. Because it is assumed that the net wage exceeds the benefit, this reduces expected utility. The second term represents the effect on the net wage. An increase in the tax rate, reduces the net wages, although there can be an upward effect on the gross wage. The third term represents the marginal benefits of a tax increase. It has a positive effect on the benefit, in spite of the higher price of the system due to a less favourable ratio of employed to non-employed. The fourth term represents the effect on real profits. The increase in the tax rate affects employment and production negatively, and thereby profits although that can be a partially offsetting effect of higher real wages, and therefore higher producer prices. Appendix 5.1 shows that this offsetting effect is dominated by the effect of less employment, so real profits are reduced by an increase in the tax rate.

It follows that there is a trade-off between the positive effect of a change in the tax rate on the benefit level and gross wages, and the negative effects through lower net wages, and the induced change in employment for workers. Producers do face only negative effects. Given that a positive social insurance tax rate exists, this tax rate is lower than the one preferred by the workers in equilibrium. As a result, an increase in the relative political influence of workers will exert an upward effect on the tax rate, while an increase in the relative influence of producers will exert the opposite effect. Because it follows from the first-order condition that in equilibrium the workers' marginal benefit of a change in the tax rate is larger than is their marginal cost, an increase in the tax rate has a positive effect on the benefit level, although there is a negative employment effect. The positive relation between the tax rate and benefit level, $\frac{\partial\eta\omega}{\partial\tau} > 0$, implies that whether tax rates are lowered or raised (due to tax competition), the benefit levels are also lowered or raised, respectively. For that reason we analyze only effects on the tax rate. The qualitative effects on benefit levels are similar in spite of the opposite changes in the ratio of employed to non-employed.

In the long-term producers earn no profits, so their income is not affected by changes in the social insurance tax rate. For that reason it is assumed that only workers decide on social insurance policy in the long-term analysis, so $D = HE(U_l)$. Compared to the first-order condition presented in equation (5.11) for the short-term analysis, the effects on profits disappear. The workers' marginal benefits and costs equalize in that case. Thus, workers' preferred tax rate is also the optimal tax rate now. The positive effects of an increase in the tax rate on the benefit and gross wages is exactly offset by the negative effects on the net wage and employment.[11]

5.4 The Nash Equilibrium

After having analyzed the optimal tax rate of one country, we examine the Nash equilibrium. At first, we derive the reaction of the policymakers to a change in the foreign tax rate. In the first-order condition we substitute equation (5.7) to eliminate real profits, and substitute the elasticities, $\epsilon_\tau^N = -\frac{\partial N}{\partial \tau}\frac{\tau}{N} > 0$, and $\epsilon_\tau^\omega = \left(\frac{\partial \omega}{\partial \tau} + \frac{\partial \omega}{\partial N}\frac{\partial N}{\partial \tau}\right)\frac{\tau}{\omega} > 0$. This is shown in appendix 5.2. Hereby it is assumed that all firms within a country are identical. In addition, it is assumed that the elasticities are constant, and that the utility function is of the CRRA type. Real wages are eliminated by multiplying the modified first-order condition by $\omega^{\sigma-1}$. Total differentiation of equation (5.11) with respect to the home and foreign tax rate, taking into account the effects on employment gives

$$\frac{dZ^I}{d\tau^I}d\tau^I + \frac{dZ^I}{d\tau^J}d\tau^J = 0 \qquad I \neq J \qquad I,J = A,B \tag{5.13}$$

Equation (5.13) describes the reaction of the policymakers in the home country to a change in the foreign tax rate. The coefficients are given by

$$\frac{dZ^I}{d\tau^H} \equiv \frac{\partial Z^I}{\partial \tau^H} + \frac{\partial Z^I}{\partial N^I}\frac{\partial N^I}{\partial \tau^H} \qquad H,I = A,B \tag{5.14}$$

$\frac{dZ^I}{d\tau^I}$ represents the second-order condition of maximisation of the policy function. Its sign is negative. $\frac{dZ^I}{d\tau^J}$ indicates the effect of a change of the foreign tax rate on marginal welfare with respect to the home tax rate. This effect on the home country is induced by

[11] Note, that this result does not imply that the tax rate is higher in the long term. Because the number of firms is endogenous now, the values of the derivatives of prices and employment with respect to the tax rate are also changed.

the change in trade flows, which affects employment and thereby also profits (note that $\frac{\partial Z^I}{\partial \tau^J} = 0$). These effects will be discussed in more detail.

The term $\frac{\partial Z}{\partial N}$ indicates the effect of employment on the marginal value of the policy function with respect to the tax rate. For the long-term case, this effect consists of two elements. At first, an increase in employment decreases the probability of being non-employed. This implies that the negative effect of an increase in the tax rate on the net wage becomes relatively more important. As a consequence, the demand for social insurance expressed by workers will decrease. Second, an increase in employment decreases the price of the social insurance system. For any value of the tax rate the benefit rate will be higher. The substitution effect gives an incentive to raise the tax rate, but their is an opposed income effect. In the long-term case the substitution effect is undoubtedly dominated (see appendix 5.2), so $\frac{\partial Z}{\partial N} < 0$. This implies that if employment is stimulated by an increase in the foreign tax rate, workers demand less insurance.

For the short-term case, the derivative also contains a third effect, the positive effects of a change in employment on real profits. Given that $1 - \sigma < 0$, this effect is positive. This last inequality is imposed, because the second-order condition of the maximisation problem has to be satisfied. An increase in real profits raises the marginal costs of the tax rate. Because an increase in the foreign tax rate lowers production, employment and real profits (due to the overall loss in consumer purchase power), producers are more interested in lowering the home tax rate. Workers demand more insurance, because the increase in the foreign tax rate has a negative effect on employment in the short run. This relation between the demand for insurance and employment is similar as in the case of free entry and exit. The opposing interests of workers and producers imply that the sign of $\frac{\partial Z}{\partial N}$ is ambiguous in the short term.

From this analysis it follows that the slopes of the reaction functions are not unambiguously clear in the short term. The distribution of the political power seems to be a relevant element. If the political influence of the workers is relatively large, the sign of $\frac{\partial Z}{\partial N}$ will be negative, while it will be positive if the influence of the producers is relatively large. In the long term, however, $\frac{\partial Z}{\partial N}$ has undoubtedly a negative sign. The slopes of the reaction curves are negative if $\frac{\partial N^A}{\partial \tau^B} > 0$, that is to say if the condition $\frac{\theta \omega_N N}{(1-\theta)\omega} > 1$ is met. For this reason we will assume as a benchmark case that $\frac{dZ^I}{d\tau^J} < 0$. Given that the reaction curves are defined for every positive value of the foreign tax rate, and assuming that both countries are identical, there exists at least one Nash equilibrium. If the additional assumption is introduced that $|\frac{dZ^I}{d\tau^I}| > |\frac{dZ^I}{d\tau^J}|$,[12] the Nash

[12] In a dynamic set up this condition implies that the Nash-equilibrium is stable.

equilibrium is unique. In the remainder of this chapter we will assume that these assumptions are satisfied.

5.5 The Coordinated Equilibrium

This section derives the coordinated equilibrium, and compares it with the Nash equilibrium to consider the question of whether the member states use the social insurance tax rates strategically in the Nash equilibrium to improve employment and competitiveness of their firms. Such strategic behaviour of member states could lead to an inefficient high or low provision of social insurance.

In general, noncoordinated behaviour under the Nash-equilibrium is not efficient due to the external effects of decision making. The fiscal externalities could be corrected if the countries would coordinate decision making on social insurance policy. With the term 'coordination' we characterise the situation that countries decide autonomously on the level of social insurance, but in a mutual action with the other countries they set tax rates such that the reciprocal external effects are effectively taken into account. Because there is no central authority in the EU, the externalities can only be internalized if countries voluntarily coordinate their decisions. So, coordination must be 'welfare' improving for all countries involved. This is guaranteed if

$$dD^I = \frac{\partial D^I}{\partial \tau^I} d\tau^I + \frac{\partial D^I}{\partial \tau^J} d\tau^J > 0 \quad I \neq J \quad I,J = A,B \tag{5.15}$$

If this expression is evaluated at the Nash equilibrium, it follows that policymakers in country A want to coordinate decision making in case

$$\begin{aligned} dD^A = \Bigg[& \xi (U((1-\tau)\omega) - U(\eta\omega)) \frac{\partial N^A}{\partial \tau^B} + \xi N(1-\tau^A) \frac{d\omega^A}{d\tau^B} U'((1-\tau)\omega) \\ & + \xi (H-N) \frac{d\eta\omega^A}{d\tau^B} U'(\eta\omega) + n \frac{d(\pi_i/p)^A}{d\tau^B} U'(\pi_i/p) \Bigg] d\tau^B > 0 \end{aligned} \tag{5.16}$$

This inequality implies that policymakers want to coordinate decision making in the cases that, first, the other country decreases its tax rate, if the expression in brackets has a negative sign, and, second, the other country increases the tax rate, if the expression in

brackets has a positive sign. For the signs of the derivatives we refer to section 5.3 and appendix 5.1.

In the short term, workers and producers only want to coordinate decision-making with the other country if the foreign social insurance tax rate is lowered, because lower foreign tax rates improve employment, wages and profits. If there is no entry and exit, a lower foreign tax rate has such a large effect on consumer purchase power that production, employment, and real profits will increase in country A. Of course, the home country (A) gets a comparative disadvantage by lower foreign labour costs. However, the purchase-power effect dominates, such that on net, employment, real wages, production and real profits in country A increase. Thus, workers and producers benefit from lower foreign tax rates in the short term.

In the long term, profits disappear caused by entry and exit of firms. Due to the increase in the foreign tax rate, and the accompanying increase in labour costs that foreign firms face, some of these firms will go out of business, while new home firms enter the market. The increase in the number of home firms improves competition on the home market substantially, and more than offsets the loss of competitiveness due to the elimination of foreign firms. As a result, the upward effect of an increase in the foreign tax rate on the average price level is very modest. Therefore, it is not necessarily the case that this effect dominates. Assuming that the sufficient condition $\frac{\theta \omega_N N}{(1-\theta)\omega} > 1$ is met, the effect on the price level is dominated by the comparative-advantage effect for the home country. Then, an increase in the foreign tax rate exerts an upward effect on employment and real wages, and consequently raises welfare.

Suppose that countries agree to coordinate their decisions by acting 'as if' they maximise the following policy function

$$D^{I'} = D^I + D^J \qquad I,J = A,B \tag{5.17}$$

It is of interest to consider the direction of the change in the tax rates compared to the Nash equilibrium. Taking the derivative of this modified policy function for country A, and evaluating it in the Nash-equilibrium, see equation (5.11), it follows that

$$Z^{A'} \equiv \frac{dD^B}{d\tau^A} = \xi(U((1-\tau)\omega) - U(\eta\omega))\frac{\partial N^B}{\partial \tau^A} + \xi N(1-\tau^B)\frac{d\omega^B}{d\tau^A}U'((1-\tau)\omega)$$
$$+ \xi(H-N)\frac{d\eta\omega^B}{d\tau^A}U'(\eta\omega) + n\frac{d(\pi_i/p)^B}{d\tau^A}U(\pi_i/p) \tag{5.18}$$

$Z^{A'}$ represents the net externality of the tax rate that is faced by the foreign country (B). This externality has some similarities with the one in Mintz & Tulkens (1986). In their model, which deals with commodity tax competition between member states, there are two opposite external effects: one on the tax base of the other country, and the other one on consumer good prices (terms-of-trade externality). They prove that in an economy in which both member states produce and trade with each other the externality on the consumer goods prices is dominated.

Here these opposing external effects are hidden in the expression $\frac{\partial N^B}{\partial \tau^A}$, and consequently also in the derivatives of real wages and profits with respect to the foreign tax rate. This is due to the fact that wages are fully indexed to prices in this model. If the terms-of-trade externality dominates $\frac{\partial N^B}{\partial \tau^A} < 0$, and if this externality is dominated the inequality sign reverses. In addition, there are external effects on foreign real wages and foreign profits (in the short run) in this model. We label these external effects together with the one on the foreign tax base as the comparative-advantage externality in this model. These external effects depend fully on the change in employment. Given that the effect of change on foreign employment is determined, all external effects work in the same direction.

Due to the large effect of an increase in the tax rate on the average price levels in the short run, the terms-of-trade externality dominates. This has a negative effect on production, employment, and real wages in the foreign country. Because of less demand, real profits shrink. Then, equation (5.18) has clearly a negative sign. The tax rates are, thus, inefficiently high in the Nash equilibrium compared to the situation that countries coordinate social insurance policies.

In the long term, the effects of the terms-of-trade externality are reduced, due to adjustments in the number of firms. More expensive firms, located in country A, leave the industry, while cheaper producing firms enter the industry in country B. As a result, the upward effect of an increase in the tax rate on the average price levels is reduced substantially. Given that the degree of substitution between home-produced and foreign-produced goods is sufficiently large, and that wages are relatively sensitive to changes in employment, the externality on the tax base tends to dominate. Countries set the tax rate strategically low to obtain a comparative advantage of their firms in order to stimulate production, and employment in their own country, if $(b-1)\omega_N N > \omega$. An increase in employment has also a positive effect on the real wage. It follows that the sign of equation (5.18) is positive. Then, the levels of social insurance are inefficiently low in the Nash equilibrium compared to the coordinated equilibrium.

The inequality above suggests that the modelling of the labour market affects the underprovision result. In this model attention was paid to real rigidities on the labour market. According to Layard. et al. (1991) these are substantial in the EU member states. However, nominal rigidities on the labour market are ignored in this analysis. With fixed nominal wages there are no price effects on nominal wages as is the case in this model. This issue is worked out in Lejour (1994). The qualitative results of that model suggest that overprovision result is weakened. However, it was the main aim of this chapter to see whether there is tax competition in the field of social insurance policy even if labour is hardly mobile. The answer to that question is positive.

These result shed also some other light on the well-known conclusion in the literature that countries have to tax their immobile factors in an integrated market. This analysis suggest that there are may be upper limits on labour income tax rates in the long run, because of the linkage between the distorted labour market and the consumer goods market. Of course, direct taxes on profits or capital have also strong negative effects on the tax base. The last decade these tax rates, especially corporate tax rates, are indeed substantially reduced in Europe. However, given the size of the social insurance budget, and distortions on the labour market, a decrease in capital income and profit taxes can be less effective in stimulating the own industries and employment than a decrease in labour income taxes, such as the social insurance tax if the comparative-advantage effect of lower social insurance contributions dominates the purchase-power effect. Glancing at policy plans and economic advices in most EU member states it seems that this is indeed the case. A downward adaption of taxes on the immobile factor labour could, thus, be an important competitive policy instrument for the member states in the next decades. The analysis also suggests that the effectiveness of this measure critically depends on the flexibility (no barriers to enter the market) and the degree of competition on the consumer goods market.

Normally, tax competition is defined as the case in which countries compete to attract the mobile good with the use of the tax rate on that good, see Wildasin (1988). In this case, as in chapter 4, the competitive instrument is the social insurance tax rate, a tax rate on an immobile good. The relation between the tax rate and the mobile good is indirect. The result is based on the two-sided link between consumer good markets and distorted labour markets. In the first place, the size of the trade flows determines partly production and employment, and consequently the tax base of the social insurance system. In the second place, the tax rate affects consumer good prices induced by changes in the labour costs, and therefore trade flows. Consequently, also in this case a

change in the tax rate distorts the tax base, although the effect is indirect through the change in trade flows.[13]

5.6 A Reduction of Trade Barriers

In 1985 the member states of the European Union agreed to take about 300 measures to complete the internal market in 1993. These measures consist of the abolition of border control and administrative barriers, convergence of technical standards, and non-discrimination of foreign bids for public purchases in the Union.[14] It is expected that the benefits of these measures will spread out over all member states, although Neven (1990) argues that the effects for the northern member states may be modest. Besides, in Bliss & Braga de Macedo (1990) it is argued that the new southern member states can obtain the benefits only after an adjustment period.

This section analyzes the effects of a further integration of the consumer goods markets on social insurance by reducing the trade barrier costs, t. It is assumed that both countries are identical, so the reduction in trade barrier costs has similar effects in both countries. For simplicity the analysis is carried out for only one country. The assumption that $|\frac{dZ^I}{d\tau^I}| > |\frac{dZ^I}{d\tau^J}|$ guarantees that the results for the one-country analysis carry over to the Nash equilibrium. This section also assumes that the elasticities are constant and that the utility function is of the CRRA type. Given these assumptions, the first-order condition is differentiated with respect to the tax rate and trade barrier costs in both countries taking into account the effects on employment.

$$\frac{dZ}{d\tau} d\tau + \frac{\partial Z}{\partial N}\frac{\partial N}{\partial t} dt = 0 \tag{5.19}$$

$\frac{\partial Z}{\partial N}\frac{\partial N}{dt}$ represents the total effect of a change in trade barriers on marginal welfare with respect to the tax rate. As in the previous section, this effect is induced by the change in the trade flows, which affects employment and thereby real wages and profits.[15] Lower trade barriers exert a downward effect on prices, and stimulate trade and production in

[13] In Bucovetsky & Wilson (1991) and chapter 4 the same sort of result is derived. In both models a tax on labour income is used by the jurisdictions as an instrument to attract mobile capital.

[14] More detailed information on these measures and the costs of not removing these barriers is given in Emerson et al. (1988).

[15] The first-order derivatives of the economic variables with respect to the trade barriers can be derived in a similar way as is done in appendix 5.1 with respect to the tax rate. The second-order derivatives are written out in appendix 5.2.

both countries. As a consequence, employment levels and real wages are pushed up. In the short term, real profits do also increase, while in the long term new firms enter the market. As explained in section 5.4, risk-averse workers prefer less insurance due to the increase in employment, and consequently a lower tax rate in the long term. In that case lower trade barriers will have a downward effect on the social insurance tax rates. From the first-order condition it follows that not only the tax rates, but that also the benefit levels are reduced.

The effects in the short term are not unambiguously clear. Lower trade barriers stimulate production, and thereby also profits in our model. As a result, the marginal costs of taxes for producers decrease, so there is less opposition against social insurance. However, workers do demand less insurance at the margin. So, workers and producers have different preferences about the direction of the change of the tax rate, as can be seen in the ambiguity of $\frac{\partial Z}{\partial N}$ in the short run.[16] Because workers and producers react differently to the further integration of consumer goods markets, the political power of both groups becomes a determining factor in the decision-making process.

It can also be shown that a liberalization of consumer goods market exerts a downward effect on social insurance if these policies are coordinated. If the first-order condition, equation (5.11), is combined with the effect on foreign welfare, equation (5.18), and constant elasticities are assumed, it is easy to show that an increase in employment due to lower trade barriers reduces the marginal welfare of social insurance taxes for both countries in the long term. Then, lower trade barriers stimulate employment, and affect the level of social insurance negatively. In the short term, the increase in production and employment has a positive effect on profits, and reduce therefore the marginal costs of taxation. The workers want to reduce the social insurance tax rate. Thus, the net effect is not clear in the short run.

Whether social insurance policies are coordinated or not, the qualitative effects of lower trade barriers are similar. However, these results do not say anything about a change in the degree of policy competition in the area of social insurance due to more integrated consumer markets. This effect could be analyzed by differentiating the marginal welfare externality with respect to the trade barriers. An increase in the

[16]Note that this ambiguity also follows from the assumption that producers have no market power, see equation (5.9). This assumption is made for the sake of simplicity. If firms would have market power, their mark up would depend on their market shares at home and abroad. Then, it could follow that a reduction in tariffs on both markets would have a negative effect on profits because the marginal loss at the home market could dominate the marginal benefits at the foreign markets. The simulation results of Smith and Venables (1988) do suggest that profits are reduced by the internal market programme. In that case, it is in the interest of both workers and producers to reduce the social insurance tax rate. Given this stage of integration in the EU, it is expected that the process of integration will exert a downward pressure on the social insurance system.

marginal welfare externality due to lower trade barriers would suggest that tax competition increases (decreases) if the marginal externality has a positive (negative) sign. However, the effect on the marginal welfare externality is ambiguous. So, it is not clear whether policy competition is increased or not. Therefore, the model has to be simplified, as is done in chapter 6.

5.7 Conclusions

This chapter analyzes the effects of the completion of the internal market on the social insurance policies in the EU member states. The analysis is carried out by combining three strands in the literature; the imperfect competition models with increasing returns and trade, the two-country fiscal federalism models, and the literature on labour market distortions. It is assumed that social insurance benefits are financed by workers-based taxes, which exert an upward pressure on labour costs due to tax shifting from workers to employers. The existence of social insurance systems then affects employment and competitiveness, because labour costs are reflected in consumer good prices that are set by producers. The decisions on the social insurance tax rate levels are a compromise between the preferences of workers which benefit from the system on average and producers which are net contributors.

Our two-country model shows that member states can use their social insurance tax rate as an instrument to tax consumers abroad that buy imported goods or to improve employment and competitiveness of their firms in an integrated consumer goods market. This leads to over- or underprovision of social insurance compared to the case that social insurance policies are coordinated in the economic union. The model shows that the terms-of-trade effect dominates in the short run. Then, countries set inefficiently high tax rates in order to tax foreign consumers. In the long run, the terms-of trade effect is reduced by entry and exit of firms. If the degree of substitutability between home- and foreign produced goods is large enough, and real wages are sensitive for changes in employment, the terms-of-trade effect is dominated by the comparative advantage effect. Then, countries set inefficiently low tax rates in order to obtain comparative advantages. If the two mentioned conditions are met, the effects in the short run and in the long run can differ substantially.

Because the completion of the internal market reduces the number of instruments of the member states to favour their own industries and the size of the distortions on the labour markets, it can be expected that the use of social insurance taxes as an instrument to obtain comparative advantages will be increased. On the other hand, the opportunities to tax consumers abroad are also increased. From both perspectives the prevailing

opinion that social insurance policies are purely a national issue has to be corrected. Although harmonisation is not necessary, coordination of decision making seems to be fruitful in spite of the fact that labour is hardly mobile in the EU if the incentives to obtain comparative advantages and to tax consumers abroad do not offset each other.

In the second part of the chapter analyses the effects of the reduction and elimination of trade barriers. The implementation of the internal market programme has a negative effect on the social insurance budget in the long term. Due to the reduction in trade barriers employment, real wages, and production will increase. These effects reduce the need for social insurance, and have therefore a negative effect on the social insurance tax rates and benefit levels in the EU.

The conclusions of this chapter suggest that social insurance policies are used as a competitive instrument in the EU. It is not clear whether these policies are more frequently used as an instrument for policy competition. The choice for the social insurance tax rate as an instrument for policy competition due to a restriction of other policy instruments as consequence of the internal market programme is not modelled here. Therefore models are needed that endogenise the choice for policy instruments. These models could analyze the shift between policy instruments into more depth; see chapter 6.

This chapter does not give a full answer to the question whether there is under- or overprovision. We need quantitative results of the real and nominal rigidities on the labour market, and the importance of the terms-of-trade effect relative to the comparative-advantage effect in order to determine the net effect of tax competition on the provision of social insurance. Although this effect is not clear, the qualitative results of our model suggest that potentially these effects could be important.

Appendix 5.1 The Derivatives with respect to the Social Insurance Tax Rate

This appendix derives the derivatives of economic variables, such as employment, profits (or the number of firms), and real wages with respect to the tax rate in country A. It presents the necessary steps to derive the signs of these derivatives. The derivatives with respect to country B's tax rate can be derived in a similar way, but are not presented here. We assume throughout the whole appendix that countries are identical. In the derivations we often use the derivatives of the market shares for convenience. The market shares of firm i in country A and B, s_i^A and s_i^B, are defined as

$$s_i^A \equiv \frac{p_i^A x_i^A}{\sum_i p_i^A x_i^A + \sum_j p_j^A (1+t_j^A) x_j^A} = \frac{1}{n^T}\left(\frac{p_i^A}{p^A}\right)^{1-b} \qquad s_{n^B+i}^B = \frac{1}{n^T}\left(\frac{(1+t)p_{n^B+i}^B}{p^B}\right)^{1-b} \qquad i = 1,\ldots,n^A \tag{A5.1}$$

The expression after the last equality sign is derived by substituting the demand functions. By definition $\sum_i s_i^A + \sum_j s_j^A = 1$, from which market shares of foreign producers can be derived.

At first, the derivatives of the price index, the market shares, and the consumer good prices are derived, see equation (5.5), (A5.1), and (5.9). Superscripts are omitted if the derivatives with respect to τ^A are similar for both countries. It is assumed that producers a and b are representative in country A and B, respectively.

$$\frac{\partial p_a^A}{\partial \tau^A} = \frac{\partial p_a^B}{\partial \tau^A} = p_a^A\left(\frac{1}{\omega^A}\frac{\partial \omega^A}{\partial \tau^A} + \frac{1}{p^A}\frac{\partial p^A}{\partial \tau^A}\right) \tag{A5.2}$$

$$\frac{\partial p_b^A}{\partial \tau^A} = \frac{\partial p_b^B}{\partial \tau^A} = p_b^B\left(\frac{1}{\omega^B}\frac{\partial \omega^B}{\partial \tau^A} + \frac{1}{p^B}\frac{\partial p^B}{\partial \tau^B}\right) \tag{A5.3}$$

$$\frac{\partial p}{\partial \tau^A} = p\left(\frac{1}{(b-1)n^T}\frac{\partial n^T}{\partial \tau^A} + \frac{s_a}{1-b}\frac{\partial n^A}{\partial \tau^A} + \frac{s_b}{1-b}\frac{\partial n^B}{\partial \tau^A} + \frac{n^A s_a}{p_a}\frac{\partial p_a}{\partial \tau^A} + \frac{n^B s_b}{p_b}\frac{\partial p_b}{\partial \tau^A}\right) \tag{A5.4}$$

$$\frac{\partial s_a}{\partial \tau^A} = -\frac{s_a}{n^T}\frac{\partial n^T}{\partial \tau^A} + (b-1)s_a\left(\frac{\partial p}{p\,\partial \tau^A} - \frac{\partial p_a}{p_a \partial \tau^A}\right) \tag{A5.5}$$

$$\frac{\partial n^A}{\partial \tau^A}s_a + n^A\frac{\partial s_a}{\partial \tau^A} + \frac{\partial n^B}{\partial \tau^A}s_b + n^B\frac{\partial s_b}{\partial \tau^A} = 0 \tag{A5.6}$$

With the help of these equations we derive a relation between the derivatives of the home and foreign real wage with respect to the tax rate. The following substitutions are carried out: first, substitute (A5.2) in (A5.5) and do the same for the derivative $\frac{\partial p}{\partial \tau^A}$, second, substitute the derivatives of the market shares in (A5.6) for country A and B, and, third, add up equation (A5.6) for both countries. As a result, it follows that

This relation holds whether the number of firms is endogenous or not. Now, we discuss, first, the case that the number of firms is fixed, so $\frac{\partial n^A}{\partial \tau^A} = \frac{\partial n^B}{\partial \tau^A} = 0$. Then, the derivative of employment within a firm

$$\omega_\tau + \omega_N\left(\frac{\partial N^A}{\partial \tau^A} + \frac{\partial N^B}{\partial \tau^A}\right) = 0 \tag{A5.7}$$

This relation holds whether the number of firms is endogenous or not. Now, we discuss, first, the case that the number of firms is fixed, so $\frac{\partial n^A}{\partial \tau^A} = \frac{\partial n^B}{\partial \tau^A} = 0$. Then, the derivative of employment within a firm with respect to the tax rate becomes, see equation (5.8)

$$\frac{\partial L_a^A}{\partial \tau^A} = c\frac{\partial x_a^A}{\partial \tau^A} + c\frac{\partial x_a^B}{\partial \tau^A} = cx_a^A\left(\frac{1}{s_a^A}\frac{\partial s_a^A}{\partial \tau^A} - \frac{1}{p_a^A}\frac{\partial p_a^A}{\partial \tau^A}\right) + cx_a^B\left(\frac{1}{s_a^B}\frac{\partial s_a^B}{\partial \tau^A} - \frac{1}{p_a^B}\frac{\partial p_a^B}{\partial \tau^A}\right) < 0 \tag{A5.8}$$

The derivative of foreign employment with respect to the tax rate has a similar structure. Combining both derivatives and multiplying by n we get

$$\frac{\partial N^A}{\partial \tau^A} + \frac{\partial N^B}{\partial \tau^A} = -(N^A - n^A c_0)\left(\frac{1}{p^A}\frac{\partial p^A}{\partial \tau} + \frac{1}{p^B}\frac{\partial p^B}{\partial \tau}\right) = -\frac{\omega_\tau}{\omega_N} < 0 \tag{A5.9}$$

The last equality in equation (A5.9) follows from (A5.7). So, it follows that the average price level in both countries together will increase due to higher tax rates. Combining equation (A5.9) with equation (A5.4) in which equation (A5.2) and (A5.3) are substituted, we can express both derivatives of the average price levels as a function of the derivative of the foreign real wage. These derivatives are substituted in the derivative of foreign employment, $\frac{\partial N^B}{\partial \tau^A}$. Then, this derivative is expressed in derivatives of foreign real wage with respect to the tax rate. Using this, it follows that

$$\frac{\partial \omega^B}{\partial \tau^A}\left(1 + \frac{\omega_N N}{\omega}\left(b + \frac{(s_a^A - s_b^A)}{2s_b^A}\right) + \frac{\omega_N}{\omega}\frac{(b-1)cI}{(1+t)p_b^B}\frac{(s_a^A - s_b^A)}{2}\right) = -\frac{\omega_\tau}{2} < 0 \tag{A5.10}$$

So, $\frac{\partial \omega^B}{\partial \tau^A}, \frac{\partial N^B}{\partial \tau^A} < 0$. Using equation (A5.7), it follows that $\frac{\partial \omega^A}{\partial \tau^A} > 0$. The derivative of home employment with respect to the tax rate can be derived in a similar way as foreign employment. As a result, we get $\frac{\partial N^A}{\partial \tau^A} < 0$. From the derivatives of real wages it follows that $\frac{\partial s_a}{\partial \tau^A} > 0$, and $\frac{\partial s_b}{\partial \tau^A} < 0$. Before the derivatives of the profits are determined, the profit function is rewritten using the expressions for prices and employment, to express real profits as a function of real wages and employment, see equation (5.5).

$$\frac{\pi_a}{p^A} = \frac{\omega}{(b-1)n^A}(N^A - n^A b c_0) > 0 \tag{A5.11}$$

Because an increase in the tax rate raises the real wage, but lowers employment in country A, the effect on profits is not immediately clear. However, using the relation between the derivatives of real wages and employment (not showed here), it follows that the derivative of employment dominates such that

$\frac{\partial(\pi_a^A/p^A)}{\partial\tau^A} < 0$. The increase in the tax rate has a negative effect on foreign real wages and foreign employment, so the effect on foreign real profits is also negative.

Now, we consider the case that there is free entry and exit. Then, profits are zero, and production and employment per firm are fixed. So, it follows that the sign of equation (A5.8) is zero. This is valid for both countries. After substitution of the derivatives for market shares and prices, equation (A5.2), and (A5.5) in (A5.8) for both countries, and adding up the resulting two expressions it follows that the derivatives of the average prices can be expressed as a function of the change in the total number of firms.

$$\frac{1}{p^A}\frac{\partial p^A}{\partial\tau} + \frac{1}{p^B}\frac{\partial p^B}{\partial\tau} = -\frac{2}{n^T}\frac{\partial n^T}{\partial\tau} \tag{A5.12}$$

In addition, we know from equation (A5.7) that the change in the real wages of both countries together is zero. Moreover, the change in employment of both countries together depends solely on entry and exit of firms. Using this in equation (A5.7) it follows that

$$\frac{\partial n^T}{\partial\tau^A} = -\frac{n^A\omega_\tau}{\omega_N N} < 0 \tag{A5.13}$$

Substituting this result in equation (A5.12), it shows that the average price level in both countries together increases due to higher tax rates.

The derivative of the number of home firms can be simply determined by using equation (A5.6) and substituting, $\frac{\partial n^T}{\partial\tau^A} = \frac{\partial n^A}{\partial\tau^A} + \frac{\partial n^B}{\partial\tau^A}$, and the derivatives of the market shares. As a result

$$\frac{\partial n^A}{\partial\tau^A} = \frac{n^A}{n^T}\frac{\partial n^T}{\partial\tau^A} + (b-1)\frac{n^A}{\omega^A}\frac{\partial\omega^A}{\partial\tau^A} + \frac{(b-1)n^A s_b^A}{s_a^A - s_b^A}\left(\frac{1}{p^B}\frac{\partial p^B}{\partial\tau^A} - \frac{1}{p^A}\frac{\partial p^A}{\partial\tau^A}\right) \tag{A5.14}$$

This derivative depends on the derivatives of the average price levels which are eliminated in the following way. Substitute equation (A5.12) for $\frac{1}{p^B}\frac{\partial p^B}{\partial\tau^A}$ in equation (A5.8) that is zero in the long run. Then, both derivatives of the average prices can be expressed as derivatives of wages and the total number of firms. By substituting these expressions for the derivatives of the prices in equation (A5.14), the derivative of the number of firms in country A only depends on the derivatives of the real wages in the own country, and the total number of firms. The latter derivative is already determined in equation (A5.13). Knowing that $\frac{\partial\omega^A}{\partial\tau^A} = \omega_\tau + \omega_N L_a^A\frac{\partial n^A}{\partial\tau^A}$ and substituting the modified equation (A5.14) in this equation, it follows that

$$\frac{\partial \omega^A}{\partial \tau^A}\left(1 - \frac{\omega_N N(b-1)}{\omega}\left(1 + \frac{2bs_b^A\left(s_a^A + \frac{s_b^A}{1+t}\right)}{(s_a^A - s_b^A)\left(s_a^A + \frac{(2b-1)s_b^A}{1+t}\right)}\right)\right) = \frac{\omega_\tau}{2} > 0 \qquad \text{(A5.15)}$$

Equation (A5.15) shows that the sign of $\frac{\partial \omega^A}{\partial \tau^A}$ is not clear due to the ambiguity in the sign of the term in brackets. Assuming that $\omega_N N(b-1) \geq \omega$ is a sufficient condition to guarantee that $\frac{\partial \omega^A}{\partial \tau^A}$ has a negative sign as long as $s_a^A - s_a^B > 0$. The latter inequality is always satisfied if $t > 0$. Consequently, $\frac{\partial \omega^A}{\partial \omega^B}$, $\frac{\partial N^B}{\partial \tau^A}$, $\frac{\partial n^B}{\partial \tau^A} > 0$, and $\frac{\partial N^A}{\partial \tau^A}$, $\frac{\partial n^A}{\partial \tau^A} < 0$.

Appendix 5.2 The Second-Order Derivatives

This appendix presents the second-order derivatives of the decision-making function. The analysis is simplified by introducing the elasticities, $\epsilon_\tau^N = -\frac{\partial N}{\partial \tau}\frac{\tau}{N} > 0$, and $\epsilon_\tau^\omega = \frac{d\omega}{d\tau}\frac{\tau}{\omega} = \left(\frac{\partial \omega}{\partial \tau} + \frac{\partial \omega}{\partial N}\frac{\partial N}{\partial \tau}\right)\frac{\tau}{\omega} > 0$ in the first-order condition, equation (5.11). It follows that

$$\begin{aligned} \tau Z = {} & -\xi[U((1-\tau)\omega) - U(\eta\omega)]N\epsilon_\tau^N + \xi N\left(\frac{-\tau}{1-\tau} + \epsilon_\tau^\omega\right)(1-\tau)\omega U'((1-\tau)\omega) + \\ & \xi(H-N)\left(1 - \frac{H}{H-N}\epsilon_\tau^N + \epsilon_\tau^\omega\right)\eta\omega U'(\eta\omega) + n\frac{\pi_a}{\omega p}\left(\epsilon_\tau^\omega - \epsilon_\tau^N\frac{N}{N - bnc_0}\right)U'(\pi_a/p) = 0 \end{aligned} \qquad \text{(A5.16)}$$

Moreover, it is assumed that the elasticities are constant, and that the utility function is of the CRRA type. $\sigma_x = -\frac{xU''(x)}{U'(x)}$ is defined as the elasticity of marginal utility to income. First, it is assumed that entry and exit is endogenous. This implies that the second term on the second row of equation (A5.16) is not relevant. Real wages are eliminated from equation (A5.16) by multiplying with $\omega^{\sigma-1}$. Differentiation with respect to the tax rate gives

$$\begin{aligned} \tau\frac{dZ}{d\tau} = {} & \frac{\gamma N\epsilon_\tau^N}{1-\tau}\eta^{-\sigma} - N(1-\tau)^{-(\sigma+1)} - \frac{\partial N}{\partial \tau}\frac{H}{N}\left(1 - \frac{H}{H-N}\epsilon_\tau^N + \epsilon_\tau^\omega\right)\eta^{1-\sigma} + \\ & (1-\sigma)\frac{(H-N)}{1-\tau}\left(\gamma + \tau\frac{H}{(H-N)^2}\frac{\partial N}{\partial \tau}\right)\left(1 - \frac{H}{H-N}\epsilon_\tau^N + \epsilon_\tau^p\right)\eta^{-\sigma} \end{aligned} \qquad \text{(A5.17)}$$

The expression in equation (A5.17) is derived by substituting the first-order condition times $\frac{N_\tau}{N} - \frac{1-\sigma}{1-\tau}$ in the second-order derivative. Note that the sign of equation (A5.17) has to be negative to satisfy the second-order condition of the maximisation problem. This is more likely the larger is the degree of risk aversion. Probably it has to be larger than one. In addition, we want to know the effects of a change in employment on the first-order condition. Differentiating equation (A5.16) with respect to employment gives

$$\tau \frac{\partial Z}{\partial N} = - \frac{H}{N}\left(1 - \frac{H}{H-N}\epsilon_{\tau}^{N} + \epsilon_{\tau}^{\omega}\right)\eta^{1-\sigma} < 0 \qquad \text{(A5.18)}$$

This expression follows after substituting the first-order condition times $\frac{1}{N}$ in the second-order derivative. The sign of equation (A5.18) is always negative.

If profits do exist (the short term analysis) substitution of the first-order condition times $\frac{1}{N}$ in equation (A5.18) gives the expression in equation (A5.18) added by the positive term $-\frac{H_c}{N}\frac{\pi}{p}(\epsilon_{\tau}^{\pi} - \epsilon_{\tau}^{P})U'(\pi/p)$. In addition, $\frac{\partial Z}{\partial N}$ is extended with two other positive terms that pertain the derivatives of the real profits. Due to these three positive terms, the sign of equation (A5.18) is ambiguous. In the short run, it cannot be excluded that $\frac{\partial Z}{\partial N} > 0$.

The second-order condition of the maximisation problem consists now (if the number of firms is fixed) of equation (A5.17) added with the mentioned positive terms times the derivative of employment with respect to the tax rate which is negative. As a result, if the second-order condition of the maximisation problem in the long-term is satisfied, it is also satisfied in the short-term case. Equation (A5.17) has, thus, a negative sign.

Chapter 6

Cooperative and Competitive Policies: The European Siamese Twin?[1]

6.1 Introduction

This chapter explores the hypothesis that EU member states will shift from tariff policies to redistributive policies as an instrument for policy competition. Until recently, countries could protect their industries at the home market by setting tariff rates and by creating other barriers, such as technical regulations, customs regulations, or subsidies. By the internal market programme these possibilities are drastically reduced. Governments have to use other instruments to protect their industries or to stimulate their competitiveness. The previous chapter concluded that there is tax competition and that social insurance policies are affected by changes in trade barriers. This chapter examines whether the reduction and elimination of tariffs and other nontrade barriers will lead to (more) competition with respect to social insurance policies.

We present a two-country model in which each country has two instruments: a tax that redistributes income from producers to workers, and a tariff for ensuing an import policy. Given a certain degree of cooperation between countries in setting their tariff policies, we compare the cases that decentralized redistributive policies are coordinated, and that these policies are not coordinated.[2] From this comparison it follows whether there is tax competition that leads to inefficiently high or low tax rates.

We consider the effect of increasing integration of consumer goods markets on the degree of tax competition in the EU. The integration process is represented in two distinct ways depending on the endogeneity of the tariff rates. First, it is assumed that the levels of the trade barriers are exogenously fixed, e.g. by agreements in the EU or on a world-wide level. Then, an increase in integration is represented by lower trade barriers such as the change in trade barriers before and after the Uruguay round. Second, it is assumed that the tariff rates are endogenously determined by countries maximizing their own welfare and taking partially the welfare of other countries into account.

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[1]This is a slightly modified version of Lejour (1995a).

[2]In this paper coordination implies that countries take the welfare effects of their redistributive tax policy on the other country into account. So, redistributive policies are only coordinated if all countries gain. The term cooperation is used for the case that countries take into account the welfare effects of their tariff policies on the other countries. Note that cooperation on tariff policies may be partial here. The distinction between the expressions 'coordination' and 'cooperation' is only made for expositional purposes.

Integration is represented by giving more weight to the welfare of other countries in determining the optimal tariff rate. This is based on the idea that countries agree on reducing trade barriers, because their increased export possibilities enhance welfare, in spite of the possible negative welfare effects of the increased openness of their own market. In fact, countries agree to take the negative externalities from their noncooperative tariff policy on the other countries (more) into account if the other countries do the same. Using this representation of market integration, it makes more sense to analyse the possible shift from one policy instrument to an other, because tariff policy is still endogenous.

The degrees of tax competition before and after the increase in integration are compared with each other in order to decide whether redistributive tax rates will be more intensively used as an instrument for policy competition. For this comparison we have to measure the degree of tax competition. Until now a measure for tax competition has not been defined in the literature, because changes in tax competition have not been studied. Most of the literature only deals with the question of whether there is tax competition and analyses the circumstances in which it is present (see Wildasin (1986) for an overview). This research asks for such measure. Based on the existing definitions of tax competition (see Oates (1972) and Wildasin (1986) among others) we define two measures: one in the difference in tax rate levels, and a second one in the difference in welfare levels.

It will appear that the noncoordinated redistributive tax rates are relatively lowered to the coordinated tax rates in the integration process. If the noncoordinated tax rate is initially higher than is the coordinated tax rate, the noncoordinated tax rate converges gradually to the coordinated tax rate. Then, the external welfare effect of noncoordinated tax policy is reduced. This is an additional welfare gain of more cooperative tariff policies. If the noncoordinated tax rate is initially lower than is the coordinated tax rate, both tax rates will diverge more from each other if integration proceeds. Then, the external welfare effect of noncoordinated tax policy is increased. This diminishes the welfare gains of more cooperative tariff policies.

This chapter is also closely related to the literature on trade and fiscal competition that is discussed in section 1.4. Except for the fact that labour income is taxed, this chapter deviates substantially from that literature by examining the effects of an increase in integration, and by introducing a measure for the degree of tax competition. These issues are nearly not studied thus far. With respect to the spillover effects this chapter is related to Persson & Tabellini (1993). They also study spillover effects of policy making to other policy fields. However, this is done in a totally different setting.

Section 6.2 presents the model. The economic part of the model is based on Markusen & Venables (1988). It is a two country model with an imperfectly competitive industry in both countries whose products are sold at home and abroad. There are increasing returns to scale in that sector. The political part of the model is based on the endogenous tariff formation models of Mayer (1984) and Hillman (1989) and the welfare function in chapter 2. Optimal tariff and redistributive taxes are determined by optimising a welfare function that represents the interests of workers and producers. This discussion is split up in two sections. Section 6.3 examines the optimal noncooperative and cooperative tariff rates, and section 6.4 the optimal noncoordinated and coordinated redistributive tax rates. In section 6.5 we introduce two concepts that represent the degree of tax competition: one that measures the difference between the levels of the coordinated and noncoordinated tax rate and an other one that measures the difference in welfare levels. Both measures are used to determine the competitive effects of redistributive policies induced by further integration of the commodity markets. Section 6.6 summarizes and concludes.

6.2 The Model with Imperfect Competition and Increasing Returns

The economic part of the model is mainly based on Markusen & Venables (1988). The economic union consists of two member states, country A and B. In both countries there is an imperfectly competitive industry with increasing returns to scale. For simplicity it is assumed that all firms in this industry produce one identical product that is sold at home and abroad. Thus, there is only national product differentiation. Labour is the only production factor. The products are denoted by X and Y, produced in country A and B, respectively. The superscripts A and B indicate which part of the (aggregate) production is sold in a certain country. Products sold at home have equal consumer and producer prices, p_x^A and p_y^B, while the consumer prices of imported goods consist of producer prices (p_y^A and p_x^B), and transport and trade-barrier costs, t^A and t^B. The total demand of these commodities depends on the population size in both economies, M^A and M^B, which consists of workers and producers. Lower case letters refer to output per firm, and n_A and n_B indicate the number of firms in the imperfectly competitive industry in each country. The aggregate linear demand functions for country A read

$$\begin{aligned} X^A &= n_A x^A = M^A\left[a - p_x^A - b\left(p_x^A - (p_y^A + t^A)\right)\right] \\ Y^A &= n_B y^A = M^A\left[a - (p_y^A + t^A) - b\left((p_y^A + t^A) - p_x^A\right)\right] \end{aligned} \tag{6.1}$$

The demand functions for country B can be stated in a similar way. For simplicity it is assumed that consumers do not have different preferences for products produced at home and abroad. This is indicated by the parameter a that is similar in both equations. The parameter b may be interpreted as the degree of substitution between the differentiated goods. In addition, consumers spend the rest of their income on a third commodity, z, that is produced outside the economic union on the world market under perfect competition and constant returns to scale. The price of good z is set at one.[3]

Producers in the imperfectly competitive industry sell their products at home and abroad. The only production factor is labour. So, the profit function of a firm in country A reads

$$\pi^A = p_x^A x^A + p_x^B x^B - w(1+\tau^A) l^A \tag{6.2}$$

w represents the after tax wage per working hour, that is assumed to be constant, and τ represents the employer-based labour tax. The tax contributions are distributed to the workers by the government. The most important characteristic of this specification of labour taxes is the positive effect of labour-tax changes on gross wages. This is a crude representation of the rigidities on the labour markets in the EU.[4] l^A represents the total number of hours worked in a firm in country A. Economies to scale in production are introduced in the following way, see Krugman (1979)

$$l^A = c_0 + c(x^A + x^B) \tag{6.3}$$

c_0 are the fixed costs, and c, are the marginal costs. Because marginal costs are not increasing, the average production costs decline if production is increased. The total number of working hours in a country is defined as $L^A = \Sigma l^A$. It is assumed that every

[3]The aggregate demand functions in equations (2.1) are derived from individual demand functions. These can be based on maximising the utility function $U_i = (x_i - \beta y_i)^2 - \alpha_1 x_i^2 - \alpha_2 y_i^2 + \alpha_1(x_i + y_i) + \mu z_i$ with $\beta = (\alpha_1 - 1)b/(b+1)$, $\alpha_1 = a\mu$, $\mu = (2b+1)/((2b+1)a - b - 1)$, and $\alpha_2 = \beta^2 + \alpha_1 - 1$, taking into account the budget constraint. x_i (y_i) represents individual demand for good X (Y) (the definition of the variables is only valid in this footnote).

[4]Layard et al. (1991) provide a good description of the theoretical and empirical material on the rigidity of labour markets in Europe. The positive effect of a change in labour taxes on gross wages that is assumed in the paper can be underpinned by using a wage-bargaining function, see also chapter 4. In these models the wage rate is positively related to employment and the labour tax rate. To keep the analysis tractable, these effects are ignored, and a fixed wage rate with employer-based taxes is assumed.

member of the labour force, H, has a job in the imperfectly competitive industry. thus, everybody works L^A/H hours.[5]

Producers maximise their profits by determining the optimal prices at home and abroad. They conjecture that other producers at home and abroad do not change their supply (Cournot behaviour). It follows that[6]

$$\begin{aligned} \frac{\partial \pi^A}{\partial p_x^A} &= x^A + (p_x^A - c)\frac{\partial x^A}{\partial p_x^A} = 0 \quad \text{and} \quad \frac{\partial x^A}{\partial p_x^A} = -M^A B \quad \text{with} \quad B \equiv \frac{2b+1}{b+1} \\ \frac{\partial \pi^A}{\partial p_x^B} &= x^B + (p_x^B - c)\frac{\partial x^B}{\partial p_x^B} = 0 \quad \text{and} \quad \frac{\partial x^B}{\partial p_x^B} = -M^B B \end{aligned} \tag{6.4}$$

The four demand functions of equation (6.1) and the implicit price functions in equation (6.4) form together a system of eight equations in which demand and prices can be expressed in preferences, tariffs, labour costs, and the number of firms. In fact, there are two systems of four equations. Each system consists of demand for both goods and prices in one country that easily can be solved by repeated substitution. As a result,

$$\begin{aligned} \psi p_x^A &= (n_B+b+1)a + n_A(n_B B+b+1)\mathrm{T}^A + bn_B\mathrm{T}^B + bn_B t^A \\ \psi p_y^A &= (n_A+b+1)a + bn_A\mathrm{T}^A + n_B(n_A B+b+1)\mathrm{T}^B - (b+1)(n_A+1)t^A \\ \psi X^A &= M^A n_A B\left((n_B+b+1)a - (b+1)(n_B+1)\mathrm{T}^A + bn_B\mathrm{T}^B + bn_B t^A\right) \\ \psi Y^A &= M^A n_B B\left((n_A+b+1)a + bn_A\mathrm{T}^A - (b+1)(n_A+1)\mathrm{T}^B - (b+1)(n_A+1)t^A\right) \\ \psi &\equiv (nB+1)(n+b+1) \qquad \mathrm{T}^I \equiv cw(1+\tau^I) \qquad I = A,B \end{aligned} \tag{6.5}$$

T^I represents the labour costs per working hour in country I, consisting of exogenous wages and employer-based taxes. Notice that labour costs and the tax rate are positively related. This relation will be often used. Labour costs exert an upward effect on the prices. In addition, labour costs in a country affect the demand for goods produced in that country negatively, and the demand for goods produced in the other country positively. The tariff rate in country A protects firms located in country A. It discriminates foreign firms, which can be seen by the negative effects on the demand for the

[5]Due to the fixed costs it is theoretically possible that profits are negative if the number of firms is sufficiently large. Although it is not essential for the analysis, this possibility is ruled out by assuming that profits are nonnegative. This can easily be established by setting the right combination of values for the exogenous fixed costs and the number of firms.

[6]The results are derived by differentiating equation (6.1) with respect to prices and quantities, and setting $dY = 0$ and $dX^A = dx^A$ (Cournot behaviour). Then dx^A, dp_x^A, and dp_y^A are the endogenous variables in these two equations. Eliminating dp_y^A gives $\frac{\partial x^A}{\partial p_x^A}$, see Markusen & Venables (1988).

goods produced by these firms, and on the low producer prices. The foreign producers lower their prices to compensate partially the effect of the trade barrier in the consumer price of foreign goods.

The welfare of workers is given by the following indirect utility function.

$$U_l^A = U(\, p_x^A,\, p_y^A + t^A,\, I_l^A) \qquad I_l^A \equiv (wL^A + \tau^A wL^A + t^A Y^A)/H \tag{6.6}$$

The income of workers, I_l^A, consists of wage income, a redistributive transfer from the government, and an equiproportional share of the tariff revenues obtained from imports. Income of producers consists only of profits. Their indirect utility function reads $U_c^A = U(\, p_x^A,\, p_y^A + t^A,\, \pi^A)$.

As in chapter 2 the welfare function represents the interests of both groups in the economy, workers and producers

$$D(\, U_l^A,\, U_c^A) = \xi H U(\, p_x^A,\, p_y^A + t^A,\, I_l^A) + n_A U(\, p_x^A,\, p_y^A + t^A,\, \pi^A) \tag{6.7}$$

The parameter ξ represents the relative political influence of workers. The welfare function is maximised to determine the optimal (noncooperative) tariff rates,[7] and the noncoordinated redistributive tax rates.[8] The optimal values of these instruments are determined simultaneously. For a clear presentation of the relation between the tariff and the tax rate in the various situations with respect to cooperation and coordination, the discussion of the optimal tariff rates and optimal tax rates is split in two separate sections.

6.3 The Optimal Noncooperative Tariff Rate and the Externality

This section analyses the optimal tariff rate when tariff/trade-barrier policies are determined in a noncooperative and partially cooperative way, respectively. In determining the optimal tariff and redistributive tax rates several assumptions are made. First, it is assumed that countries are identical. This implies that $M^A = M^B = M$ and $n_A = n_B = n$. Second, governments are Stackelberg leader towards the private sector. Due to the

[7] See Mayer (1984), and Hillman (1989) for related models. In these papers a median voter model is used to determine tariff policy. As can be seen later that is a special case of this model with $\xi = 1$.

[8] Section 2.2 discusses related models of Peltzman (1980), Meltzer & Richard (1981) and Becker (1983).

separation of the analysis of the tariff and tax rates, the tax rates are sometimes taken as fixed in this section. As a result, the analysis of the relation between the tax rates and tariff rates is partial, but it does show quite clearly the role of the tariff rate in this model.

6.3.1 The noncooperative tariff rate

The noncooperative tariff rate is derived by differentiating the welfare function, equation (6.7), with respect to the tariff rate. Because marginal utility with respect to income is constant, application of Roy's identity gives the following first-order condition

$$\frac{dD^A}{dt^A} = -\zeta\left(X^A\frac{\partial p_x^A}{\partial t^A} + Y^A\frac{\partial(p_y^A+t^A)}{\partial t^A}\right) + \xi w(1+\tau^A)\frac{\partial L^A}{\partial t^A} + \xi t^A\frac{\partial Y^A}{\partial t^A} + \xi Y^A + n_A\frac{\partial \pi^A}{\partial t^A} = 0 \qquad \zeta = \xi\frac{H}{M} + \frac{n}{M} \qquad M = H+n \tag{6.8}$$

$\frac{H}{M}$ ($\frac{n}{M}$) represents workers' (producers') share of total demand in a country. The tariff rate influences nominal income of workers and producers, and consumer goods' prices at home. An increase in the tariff rate stimulates production at home, and raises tariff revenues (assuming that the left part of the Laffer curve is relevant). For these reasons nominal income of workers is increased. Profit income is affected by the increase in prices and production, and the increase in employment. Because prices exceed marginal costs, the effect on profits is positive. As a result, nominal income of both groups is raised. These are the marginal benefits of raising the tariff rate.

The marginal costs of raising the tariff rate consist of the upward pressure on both prices. Due to the increase in tariffs the consumer price of imported goods is raised. Although foreign producers lower their producer prices, it follows from equation (6.5) that this is not sufficient to offset the increase in consumer prices. As a consequence, there is less competition on the home market which exerts an upward pressure on the prices of home-produced goods. All consumer prices are, thus, raised, as can be seen in the first two terms in equation (6.8). It follows that the increase in nominal income of both groups has to be weighted against the increase in prices. This is a well known result, see Mayer (1984) and Hillman (1989).

Due to the linearity of the demand equations and the characteristics of the welfare function, equation (6.8) can be simplified. Substitution of the equations for prices, quantities, and their derivatives in the first-order condition results in a linear equation of the following form.

$$\phi_0(a,\kappa) + \phi_1(\kappa)T^A + \phi_2(\kappa)T^B + \phi_3(\kappa)t^A = 0 \qquad \kappa = \{b,n,H,\xi\} \tag{6.9}$$

The ϕ_i's are written out in appendix 6.1. Given that $\xi > 1$,[9] ϕ_0, $\phi_1 > 0$ and ϕ_2, $\phi_3 < 0$. There is, thus, a closed form solution for the tariff rate. The signs of the coefficients are very intuitive. An increase in their labour costs worsens competitiveness of home-based firms. For that reason the tariff rate will be increased to protect these firms. On the other hand, an increase in foreign labour costs, improves competitiveness of home-based firms, so they need less import protection.

Given that both countries are completely identical, a simultaneous equal increase in home and foreign labour costs (or redistributive tax rates) leads to higher tariff rates ($\phi_1 + \phi_2 > 0$). This can be explained by the lump-sum character of the tariff rates that are included in import goods. As a result, an equal increase in labour costs in both countries raises the consumption price of imported goods relatively less than those of home-produced goods. Competitiveness at the home market is, thus, relatively worsened. For this reason the tariff rate will be raised.[10]

6.3.2 The externality and the cooperative tariff rate

Noncooperative tariff policy causes externalities in the other country. Countries discriminate foreign producers in order to protect their own producers. This has a negative effect on employment and production abroad. This externality is analysed by differentiating the welfare function of the foreign country with respect to the tariff rate. This function has the same structure as the welfare function in equation (6.7).

$$\frac{dD^B}{dt^A} = \xi w(1+\tau^B)\frac{\partial L^B}{\partial t^A} + n_B\frac{\partial \pi^B}{\partial t^A} < 0 \tag{6.10}$$

The tariff rate only affects foreign nominal income, and not consumer prices. Due to the tariff, trade is restricted. This has a negative effect on sales and employment. Because of their relative poor competitiveness, foreign producers lower their export price. As a result, profits will shrink. Substitution of the demand and price functions and their derivatives in equation (6.10) leads to the following linear equation

[9]Section 6.4 discusses the necessity of this assumption.

[10]The tariff rate does not depend on the foreign tariff rate, because producers set different prices on home and foreign markets. Only if these separate markets are such integrated that producers set one price on the home and foreign market, tariff rates are mutually dependent.

$$\frac{dD^B}{dt^A} = \phi_0'(a,\kappa) + \phi_1'(\kappa)T^A + \phi_2'(\kappa)T^B + \phi_3'(\kappa)t^A < 0 \qquad (6.11)$$

The coefficients ϕ_i''s are presented in appendix 6.1, ϕ_0', ϕ_1', $\phi_2' < 0$ and $\phi_3' > 0$. ϕ_3' is positive, because higher tariff rates imply that product markets are less integrated. Then, trade is less important for a country, and so are the effects of a higher tariff rate on foreign welfare. The negative coefficient preceding T^A can be explained by the positive relation between labour costs in country A and large profits and employment levels in country B. If profits and employment are large, the effects of a change in foreign employment and foreign profits on income due to a change in the home tariff rate are also large. This explains that $\phi_1' < 0$. The negative coefficient preceding T^B is explained by the positive relation between the labour costs and workers' income in country B. Although profits are negatively related to these labour costs, this is dominated by the effects on workers' income. The larger workers' income, the more heavily it is affected by a change in the tariff rate. Then, it follows that $\phi_2' < 0$.

The externalities can be diminished (or even eliminated) if trade barriers are lowered. This is the purpose of the GATT agreements, and the acceptance of the EU internal market programme. In most economic models this is represented by a decrease in exogenous trade barriers, $\bar{t}$. One could, however, also say that countries agree to lower trade barriers, because they take (more) into account the negative externality on the other country such that they maximise the weighted combination of both welfare functions. The increased openness of their own market can harm their welfare, but this is more than compensated by the welfare enhancing effect that all other countries also increase the openness of their markets. Otherwise, countries would not agree to lower their trade barriers. Partial cooperation on tariff policies could be represented by maximising the following welfare function for both countries

$$D^{I'} = D^I + \nu D^J \qquad I \neq J, \quad I,J = A,B \qquad (6.12)$$

$\nu = 0$ represents the case that countries do not cooperate at all on tariff policies. The larger the value of ν, the more countries take account of the externality, so the larger is the degree of cooperation in this policy area. So, given an initial level of ν, the new GATT agreement at the Uruguay round or the acceptance of the EU internal market programme can be represented by an increase in ν. By using an increase in cooperation on tariff and trade barrier policies to represent market integration, tariff policy is still endogenous, although its scope is changed. This seems to correspond to reality. On a world-wide level most agreements on trade policies are focused on piece-wise reductions

of tariff levels and voluntary export restrictions (VER's). Many other trade barriers are, however, not discussed. In the EU the impressive list of necessary measures needed to integrate markets completely is not exhaustive, and, second, all sorts of exceptions do exist, see Pelkmans & Winters (1988). Thus, it seems reasonable to represent market integration in this way.

Given the welfare function for country A in equation (6.12), the optimal tariff equals

$$\phi_0(v) + \phi_1(v)T^A + \phi_2(v)T^B + \phi_3(v)t^A = 0 \quad \phi_i(v) = \phi_i + v\phi_i' \quad i = 0,1,2,3 \tag{6.13}$$

This equation is a weighted combination of the first-order conditions in equation (6.9) and (6.11). From the expressions in appendix 6.1 it follows that $\phi_1(v) > 0$, and $\phi_2(v), \phi_3(v) < 0 \ \forall \ v \in [0,1]$. Increasing cooperation has a downward effect on tariff rates as follows from differentiating the tariff rate with respect to the degree of cooperation, v.[11] Tariff rates have a negative effect on the welfare of the other country. Thus, if countries take this effect more and more into account, they lower the tariff rates. The tariff rates can become negative if v goes to 1. It is, however, not likely that countries will subsidize their imports to raise foreign welfare, so we assume that $v \in \{0, v^0\}$. v^0 represents the degree of cooperation at which tariffs are completely eliminated.

From the analysis of the noncooperative tariff rate it could be seen that a world-wide increase in labour costs exerts an upward effect on the tariff rate. This is not always the case if cooperation proceeds. If the degree of cooperation approaches v^0, a simultaneous increase in labour costs can exert a downward pressure on the tariffs.[12] This effect can be explained as follows. If integration proceeds the positive effect of high tariff rates on nominal income at home is more and more offset by the negative effect on foreign nominal income, because foreign welfare becomes relatively more important in the decision-making process. So, the positive effect on nominal income at home and abroad together is reduced. In addition, tariff rates exert an upward pressure on prices at home, and therefore a negative welfare effect. If integration proceeds this effect becomes dominant, because the positive effect on nominal income in both countries together is reduced. In that case countries lower their tariff rates in order to compensate partially for the upward effect of the tax rates on consumer prices.

[11] This result also follows if the endogenous values for the redistributive tax rates (see section 6.4) are substituted in equation (6.13), see appendix 6.3.

[12] Equation (6.13) and appendix 6.1 imply that $\phi_0(v) > 0 \ \forall \ v \in [0, v^0]$, and $\phi_1(v^0) + \phi_2(v^0) < 0$.

As said before, market integration is represented by an increase in cooperation on tariff policies, and by lower exogenous trade barriers in this model. The level of the exogenous tariff barrier that results from tariff negotiations is, of course, lower than the prevailing noncooperative tariff rate before the negotiations.[13]

6.4 The Noncoordinated and Coordinated Redistributive Tax Rate

This section analyses two polar cases of coordinating redistributive policies, one in which there is no coordination at all, and one in which perfect coordination prevails. This does not mean that complete coordination is seen as the most realistic outcome of possible negotiations on coordination of redistributive policies. It is, however, our aim to analyse the effects of more cooperative tariff policies on the degree of policy competition with respect to redistributive policy. This is most clearly seen by using these two polar cases as will become clear in section 6.5.

The employer-based tax is redistributive, because it transfers money from producers to workers. Although the taxes raise the consumer prices, workers' welfare increases due to the dominant effect of the increase in nominal income. In the chapters 3, 4 and 5 social insurance was motivated by risk-aversion. Just as in those chapters, the spillovers of redistributive policy to other countries consist here of the upward pressure of the tax rate on labour costs and the negative effect on competitiveness of firms. There is, thus, a trade-off between economic efficiency and redistribution. This trade-off is affected by further economic integration, because changes in the tariff rate influence economic efficiency. These effects are studied in section 6.5. This section derives the optimal tax rates, the external effects of decentralized redistributive policies and the relation with the trade barriers.

6.4.1 The noncoordinated tax rate

In the noncoordinated case policymakers maximise the welfare function, equation (6.7). The optimal tax rate will be the one at which the marginal benefits for workers equal the marginal costs for producers. Applying Roy's identity the first-order condition reads

[13] So, $\bar{t} < -\frac{\Phi_0 + \Phi_1 T^A + \Phi_2 T^B}{\Phi_3}$.

$$\frac{dD^A}{d\tau^A} = -\zeta\left(X^A\frac{\partial p_x^A}{\partial \tau^A} + Y^A\frac{\partial p_y^A}{\partial \tau^A}\right) + \xi w\left(L^A + (1+\tau^A)\frac{\partial L^A}{\partial \tau^A}\right) + \xi t^A\frac{\partial Y^A}{\partial \tau^A} + n_A\frac{\partial \pi^A}{\partial \tau^A} = 0 \qquad (6.14)$$

Workers' marginal benefit consists of an increase in benefit income, which is partly offset by a reduction in employment, and of an increase in tariff revenues. Because an increase in the tax rate raises labour costs and reduces competitiveness, profits will shrink. In addition, the increase in the tax rate exerts an upward effect on consumer prices which affects real incomes of workers and producers negatively. If the tax rate is positive in equilibrium, this increase in consumer prices is more than compensated by the increase in workers' nominal income. Thus, workers benefit from redistribution at the expense of producers.

Transfers from producers to workers are politically enforced by workers. Therefore, the parameter that represents the relative political power of workers is assumed to be larger than 1, $\xi > 1$. If ξ would be smaller than one, the existence of a positive tax rate could only be motivated by incentives to export taxes, and to increase tariff revenues.[14] It seems unreasonable to assume that these effects are important enough to support the existence of a positive tax rate.

Note, that the first-order condition deviates in two ways from equation (6.8). At first, redistributive taxes affect also prices and quantities of export goods, while that is not the case for a tariff. This effect can be seen by differentiating the profit function, equation (6.2). Second, labour costs per person are affected now. These differences are the main reason that tariff and redistributive policy are not perfectly substitutable in this model.

Substitution of the equations for prices, quantities and employment, and their derivatives in the first-order condition results in a linear equation of the following form.

$$\beta_0(c_0/c, a, \kappa) + \beta_1(\kappa)T^A + \beta_2(\kappa)T^B + \beta_3(\kappa)t^A + \beta_4(\kappa)t^B = 0 \qquad (6.15)$$

Note that $T^J \equiv cw(1+\tau^J)$. The coefficients are written out in appendix 6.2, $\beta_1, \beta_4 < 0$ and $\beta_2, \beta_3 > 0$. The reaction curves have a positive slope for given tariff rates. Substitu-

[14]Note that wage income and redistributive transfers equal the labour costs of producers. If $\xi < 1$ the increase in labour costs faced by producers has politically more weight than the increase in workers' income (excluding tariff revenues). So, this is a negative welfare effect. In addition, consumer prices at home are raised by an increase in the tax rate. This is also a negative welfare effect.

tion of the expressions for the endogenous tariffs rates, see equation (6.13), gives a linear relation between both redistributive tax rates. In that case the signs of the slopes of the reaction curves are not clear. These signs depend on the degree of cooperation, v. The linearity of the relation and the assumption of identical countries imply the existence of a unique Nash equilibrium, as long as the absolute value of the slopes of the reaction curves is not equal to one.[15]

The signs of the coefficients preceding the tariff rates, β_3 and β_4, are not surprising. Higher tariff rates at home protect the home market. Then, there is less need to lower labour costs in order to raise competitiveness. So, there is an upward pressure on the redistributive tax rate. On the other hand, high tariff rates abroad reduce competitiveness of home firms abroad, and have therefore a negative effect on foreign sales. The reduction in competitiveness can be (partially) compensated by lower tax rates.

The tax rate in country A can be expressed as a function of tariff rates alone if the first-order condition of the foreign country is substituted in equation (6.15).

$$T_n^A \equiv cw(1+\tau_n^A) = \frac{\beta_0(\beta_1-\beta_2) + (\beta_3\beta_1-\beta_2\beta_4)t^A + (\beta_4\beta_1-\beta_2\beta_3)t^B}{\beta_2^2-\beta_1^2} \qquad (6.16)$$

τ_n^A represents the noncoordinated tax rate. Because $\frac{\beta_1}{\beta_2} < min\{\frac{\beta_3}{\beta_4}, \frac{\beta_4}{\beta_3}\} \leq -1$, it follows that, first, the denominator has a negative sign, and, second, the coefficient preceding the home (foreign) tariff rate in the numerator has a negative (positive) sign. The relation between the tax rates and the tariff rates is, thus, similar as in equation (6.15).

In addition, we want to examine the net effect of the home and foreign tariff rate on the redistributive tax rate. Thereby we assume that countries are identical, $t^A = t^B$. However, the relation between the redistributive tax rate and both tariff rates is not clear due to the ambiguity of $\beta_3+\beta_4$. It appears that if the number of firms is relatively low (high), $\beta_3+\beta_4 > (<) \; 0$.[16] The tax rates depend, thus, positively (negatively) on the tariff rate, see equation (6.16). This can be explained by the negative relation between the degree of competition and producer prices. If the number of firms is low, producer prices are relatively high, due to market power. Then, the tariff rate is a less significant component in the consumer price. As a consequence, imported goods are more competitive on the home market. In this situation it makes more sense to use the redistributive

[15]Equation (6.15) also shows that the tax rate is not necessarily positive. As long as the labour costs are positive, this does not influence the analysis and the results. However, in the line of reasoning it will be often taken for granted that the tax rates are positive. If equation (6.13) is substituted in (6.15) it follows that the tax rate is positive if $\beta_0 - (\beta_3+\beta_4)\frac{\phi_0(v)}{\phi_3(v)} > [\beta_1+\beta_2 - (\beta_3+\beta_4)\frac{\phi_1(v)+\phi_2(v)}{\phi_3(v)}]cw$.

[16]As long as $n \leq b(b-1)$, $\beta_3+\beta_4 \geq 0$. This is a sufficient condition.

tax rate as an instrument for increasing competitiveness of home-based firms. As a result the relation between the tax rate and the tariff rate is positive. If n is relatively high the reverse reasoning holds.

The dependence of $\beta_3 + \beta_4$ on the number of firms is caused by the fact that tariff rates are not proportional to the prices of imported goods, but lump sum. The tariff rate is now comparable to an excise tax. It has the characteristic that the ratio of producer prices to consumer prices alters if producer prices change. As a result, the sign of $\beta_3 + \beta_4$ can be negative when there are many producers. However, in this stage of the integration process in the EU effects on employment and production seem to be more important than the effect on prices, see Emerson et al. (1988). This suggests that $\beta_3 + \beta_4 > 0$ is the more relevant case for the analysis.

6.4.2 The coordinated tax rate

Redistributive policies also affect welfare in the other country. In this subsection we concentrate on this externality, and derive the optimal tax rate if redistributive policies are coordinated. The marginal costs of a change in the foreign tax rate are equal to

$$\frac{dD^B}{d\tau^A} = -\zeta\left(Y^B\frac{\partial p_y^B}{\partial\tau^A} + X^B\frac{\partial p_x^B}{\partial\tau^A}\right) + \xi w(1+\tau^B)\frac{\partial L^B}{\partial\tau^A} + \xi t^B\frac{\partial X^B}{\partial\tau^A} + n_B\frac{\partial\pi^B}{\partial\tau^A} \quad (6.17)$$

The externality consists, first, of negative price effects abroad by raising taxes in the home country. This includes a tax exporting effect, and the effect that foreign producers raise their prices, because their competitiveness is improved. Second, there is an effect on foreign workers' nominal income. Total labour and benefit income are increased by the induced increase in employment, but tariff revenues are reduced. We will assume that workers's nominal income is increased. This is the case if the tariff rate per product does not exceed labour costs per product ($t^B < cw(1+\tau^B)$). Foreign profit income is certainly increased. So, the total effect of a tax increase on foreign welfare depends on the importance of the positive effects on nominal income compared to the negative effects on prices. Trade-offs in the same spirit are also present in Mintz & Tulkens (1986) and chapter 5. Notice, that in deviation from the externality on tariff policy (see equation (6.10)), the foreign country faces also welfare effects due to changes in prices and quantities on its home market.

By substitution of the price and demand functions equation (6.17) is rewritten as

$$\frac{dD^B}{d\tau^A} = \beta_0'(a,\kappa) + \beta_1'(\kappa)T^A + \beta_2'(\kappa)T^B + \beta_3'(\kappa)t^A + \beta_4'(\kappa)t^B \qquad (6.18)$$

The β_i''s are signed in appendix 6.2, $\beta_1', \beta_2' > 0$ and $\beta_3', \beta_4' < 0$. The positive coefficients preceding the labour costs reflect several opposing effects, such as the positive effect on marginal nominal income of workers and producers and the negative effect on marginal prices with respect to the home tax rate. The positive effects on marginal nominal income dominate, such that $\beta_1', \beta_2' > 0$.[17]

The first-order condition of the maximisation problem if countries take fully into account the externality, so the maximum of $D^A + D^B$ with respect to τ^A, is the combination of equation (6.15) and (6.18). Adding β_1 and β_1' results in a negative coefficient, which implies that the second-order condition of the maximization problem is satisfied. Substitution of the first-order condition for the coordinated tax rate of country B in this equation results in a relatively simple expression for the coordinated tax rate, τ_p^A.[18]

$$T_p^A \equiv cw(1+\tau_p^A) = -\frac{\beta_0 + \beta_0'}{\beta_1 + \beta_1' + \beta_2 + \beta_2'} - \frac{1}{2}t^B \qquad (6.19)$$

The coordinated tax rate depends only on the tariff rate abroad.[19] Lower trade barriers abroad reduce consumer prices abroad. This gives the coordinating countries the possibility to raise the redistributive tax rate. The reduction of trade barriers has, thus, a positive effect on the redistributive tax rate. The noncoordinated tax rate is also negatively related to the foreign tariff rate. However, in that case the negative relation is motivated by the incentive to improve competitiveness of their own firms, and countries do not care about the effect on foreign welfare due to changes in foreign consumer prices as is the case here.

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[17]The negative coefficients preceding the tariffs are explained in subsection 6.4.3.

[18]This is due to the fact that $\beta_1 + \beta_1' = 2(\beta_4 + \beta_4')$ and $\beta_2 = \beta_2' = \beta_3 + \beta_3'$.

[19]A change in country A's tariff rate affects the own tax rate positively, and the foreign tax rate negatively. Because the tax rates are positively related in the first-order condition, a change in the tariff rate affects the home tax rate positively and negatively. Due to the structure of the coefficients the two opposing effects cancel out, see footnote 18.

6.4.3 Under- or overprovision of redistributive transfers

Sofar, we did not address the issue of under- or overprovision of redistributive transfers if redistributive policies are not coordinated. In general, this issue can be solved by determining the effect of a change in the tax rate on foreign welfare in the Nash equilibrium, see equation (6.18). However, as we have seen before, the sign of this equation is ambiguous because the foreign country faces benefits and costs of increasing tax rates. There is a trade off between the positive effects of an increase in nominal income, and the negative effects of an increase in prices on foreign welfare. In particular, if the negative effects of prices are dominated by the positive effects of nominal income (as in Mintz & Tulkens, 1986) the redistributive transfers are underprovided. Sometimes it is, however, concluded that these transfers are overprovided (see Wildasin, 1993).

In spite of this ambiguity we can examine the development of the inefficient provision of redistributive transfers if the trade barriers change. We analyse the difference between the coordinated and noncoordinated tax rates in order to see whether the under- or overprovision of transfers is affected due to changes in trade barriers. Also here we use the assumption that both countries are identical. It follows that the difference in tax rates is a function of the tariff rate by substituting equation (6.16) and (6.19) in $\tau_p - \tau_n$ and multiplying with cw.

$$cw(\tau_p^A - \tau_n^A) = \psi_0 - \frac{1}{2}t_p + \frac{\beta_3+\beta_4}{\beta_1+\beta_2}t_n = \psi_0 - \left(\frac{1}{2} - \frac{\beta_3+\beta_4}{\beta_1+\beta_2}\right)t_n - \frac{1}{2}(t_p - t_n) \qquad (6.20)$$

ψ_0 represents a positive constant term that is expressed in appendix 6.4. t_n represents the endogenous tariff if countries do not coordinate their tax policies, and t_p represents the one if the countries do coordinate. Because it is assumed that countries are identical, the tariff rates are also identical for both countries. If trade barriers are determined exogenously, t_p and t_n coincide.[20]

If the sign of equation (6.20) is positive there is underprovision and if it is negative there is overprovision of redistributive transfers. The sign depends on the level of the trade barriers. Take first the case that tariff rates are fixed in the negotiation process such that $\bar{t} = t_p = t_n$. Then, a decrease in trade barriers raises the gap between the coordinated and noncoordinated tax rate, because $2|\beta_3+\beta_4| < |\beta_1+\beta_2|$. Second, we analyse the case that trade barriers are endogenous. The effects can be derived from

[20]Note that the expression above gives algebraically the same condition for the under- or overprovision of redistributive transfers as equation (4.5).

differentiating equation (6.20) with respect to the degree of cooperation on tariff policies, v. It follows that

$$cw\frac{\partial(\tau_p^A - \tau_n^A)}{\partial v} = -\frac{1}{2}\frac{\partial t_p}{\partial v} + \frac{\beta_3 + \beta_4}{\beta_1 + \beta_2}\frac{\partial t_n}{\partial v} \tag{6.21}$$

An increase in the degree of cooperation has, not surprisingly, a downward effect on the tariff rate in the coordinated and noncoordinated case, as shown in appendix 6.3. This appendix also proves that irrespective of the ambiguity in $\beta_3 + \beta_4$ the difference between the coordinated and noncoordinated tax rates is increased if there is underprovision. This result also prevails if $\beta_3 + \beta_4 > 0$ in the overprovision case. Then, the absolute difference between both tax rates is diminished.[21]

Based on these results, it follows that the gap between both tax rates, $\tau_p - \tau_n$, is raised in most cases. However, we still do not know whether the sign of the gap is positive or negative. This depends on the dominance of the positive effects of an increase in nominal income, and the negative effects of an increase in prices on foreign welfare due to a change in the home tax rate, as mentioned. Given the result that the gap between the tax rates is raised due to economic integration, it is possible that initially, if markets are less integrated, there is overprovision of redistributive transfers, while at later stages of the integration process there is underprovision. This possibility is depicted in figure 6.1 assuming that trade barriers are exogenous and endogenous, respectively.[22] Both tax rates equal each other at the point v_e^j or the corresponding tariff rate, t_e^j. The superscript j refers to the situation that $\beta_3 + \beta_4$ is negative (i) or positive (r). On the left of t_e^j and t_e^j, respectively, there is overprovision of redistributive transfers, and on the right there is underprovision. As polar cases, it is possible that the gap is negative or positive for all degrees of cooperation. These polar cases are ignored, because the analysis of the more general case - overprovision if markets are less integrated, and underprovision in later stages of the integration process - does also contain the analyses of the two polar cases.

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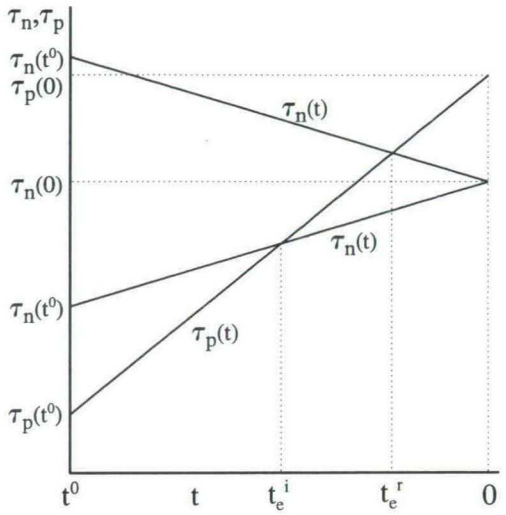
[21] If $\beta_3 + \beta_4 < 0$ this result is ambiguous, because the trade barrier is less lowered in the coordinated case than in the noncoordinated case, while the effect of a change in the trade barrier on the tax rate is larger in the coordinated case.

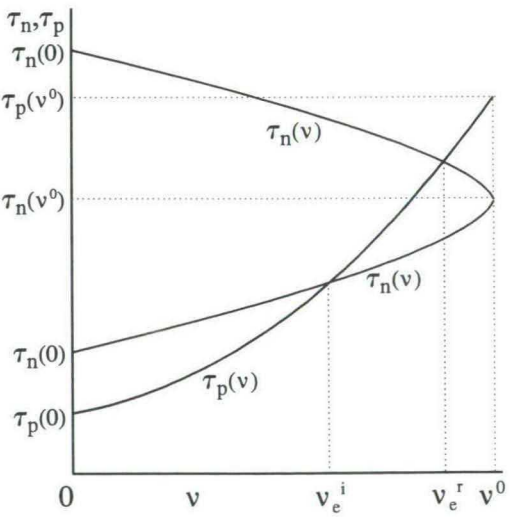
[22] Because the second-order derivatives of $\tau_i(v)$ are positive, the curves become steeper if integration proceeds. Note that it is not possible to exclude that somewhere on the trajectory $\{0, v_e^i\}$, but not in the neighbourhood of v_e^i, $\tau_p(v)$ rises steeper than $\tau_n(v)$. Then the absolute difference between both tax rates would increase.

Figure 6.1a The difference in tax rates as function of exogenous tariff rates



Market integration ⇒

Figure 6.1b The difference in tax rates as function of the degree in cooperation



Market integration ⇒

6.5 Increasing Market Integration and The Effects on Tax Competition

The previous sections discussed tariff and redistributive policies including their mutual relations. This section analyses the effects of integrating consumer goods markets on redistributive policies, and the desirability of coordinating redistributive policies in an economic union. First, we define two measures for tax competition that are needed to analyse the effects of integration. Subsection 6.5.1 uses the first measure to analyse the effects of market integration, represented by exogenous and endogenous trade barriers. The second measure for tax competition is used in subsection 6.5.2 and 6.5.3, where the analysis is split up. Both subsections contain a different way of representing market integration, see table 6.1

Table 6.1 Structure of section 6.5

subsection		Measures of tax competition:	
		tax rate levels	welfare levels
trade barriers:	exogenous	6.5.1	6.5.2
	endogenous	6.5.1	6.5.3

First, we define a measure for the degree of tax competition. The notion of tax competition has been used frequently to study local government behaviour. Often it is concluded that (Oates, 1972): "*the result of tax competition may well be a tendency toward less than efficient levels of output of local public services in an attempt to keep tax rates low to attract business investment, local officials may hold spending below levels for which marginal benefits equal marginal costs, particularly for programs that do not offer direct benefits to local business.*" In his overview Wildasin (1986) uses more or less similar terms to identify tax competition and its consequences.

Although this notion is often used, one draws in general no conclusions with respect to the degree of tax competition. Inspecting Oates' quotation a definition for the degree of tax competition seems to be fairly simple. Tax competition results in inefficient levels of public services and tax rates. This suggest that the degree of tax competition can be measured by comparing the levels of public services or tax rates that are determined efficiently (coordinated policy between countries), and inefficiently (noncoordinated behaviour) in absolute terms, $|\tau_p - \tau_n|$.[23] Although tax competition is in general

[23]Because the analysis of the relative difference between the tax rates, $|\tau_p - \tau_n|$, gives similar results as the absolute difference, only the latter representation of tax competition is presented.

analysed by examining the efficient levels of the government instruments, we are, of course, also interested in the welfare levels in the various cases. Therefore we define a second measure for the degree of tax competition: the difference in welfare levels $D_p - D_n$. In the subsequent analysis both measures will be used to study the effects of market integration.

6.5.1 Tax competition measured in tax rates

This subsection examines the effects of further market integration on the degree of tax competition if the absolute difference in tax rate levels is a proxy for tax competition. It appears that this analysis is nearly similar to the analysis of the effects of economic integration on the under- or overprovision of redistributive transfers in subsection 6.4.3. The reason for this similarity is that the provision of redistributive transfers is also measured by the difference in tax rate levels. Note, that here the absolute difference in tax rates levels is used, while that was not the case in subsection 6.4.3.

Using this measure of tax competition, it follows that integration of commodity markets, whether induced by lower exogenous trade barriers or an increase in cooperation, diminishes the gap between both tax rates if there is overprovision, while it is enlarged if there is underprovision. This result does not necessarily hold if there is overprovision, market integration is represented by an increase in cooperation, and $\beta_3 + \beta_4 < 0$. However, some information about the change in this gap can be obtained by differentiating the marginal externality, equation (6.18), with respect to the degree of cooperation.[24] This derivative has a negative sign, which suggests that the gap between both tax rates is diminished, if the curvature of the welfare function is not too much affected by the increase in market integration.

For low degrees of cooperation ($v < v_e^j$) increasing cooperation diminishes excessive redistribution, see also figure 6.1. In that situation trade barriers are high, thus prices are also high. In the coordinated case the effects of high trade barriers are mitigated by setting low tax rates. In the noncoordinated case, however, the effect on foreign prices plays no role in decisions on optimal trade barriers, thus policymakers have an incentive to set higher tax rates. If integration proceeds consumer prices will go down, such that the negative marginal utility of taxes induced by prices is reduced. In the coordinated case this implies that taxes can be raised. In the noncoordinated case the effects on employment and profits become more important. Then, policymakers use the tax rate as an instrument to get comparative advantages by lowering tax rates or raising them less

[24]This method is similar to Ghosh (1991). He analyses the effect of the number of countries on the externality in his model. Here, it follows after substitution of the expressions for tariff rates and tax rates, equation (6.13) and (6.16), respectively, in equation (6.18) that $\frac{\partial^2 D^B}{\partial t^A \partial v} > 0$ if there is overprovision. So, more market integration leads indeed to lower marginal externalities in absolute value.

than the coordinated tax rates are raised. If integration proceeds further, countries will set inefficiently low tax rates. So, there will be underprovision. That is the case if $v \geq v_e^j$.

Because the possibilities of protecting and stimulating home-based industries using trade barriers is reduced, policymakers shift to other instruments, such as redistributive policy, for that purpose. Redistributive policy is more or less used as a substitute for tariff policy to stimulate the own industries in the noncoordinated case. As a result, changes in redistributive taxes due to market integration are smaller than are the upward effects on the tax rates in the coordinated case. This lowers the degree of tax competition if there is initially overprovision of transfers, but it increases tax competition if there is underprovision. Redistributive policy is not a perfect substitute, because the tax rate does not discriminate between stimulating home-produced goods at the home market and the foreign market.[25]

6.5.2 Tax competition measured in welfare terms and exogenous trade barriers

As a second measure for the degree of tax competition, we use the difference in welfare levels, $D_p^A - D_n^A$. This subsection examines the change in the welfare difference due to lower exogenous trade barriers. The welfare difference can be written as $D_p^A(\tau_p^A, \tau_p^B, \bar{t}) - D_n^A(\tau_n^A, \tau_n^B, \bar{t})$, and notice that the tax rates depend on the trade barriers. Because of the assumption that the two countries are identical, and the optimality of the coordinated and noncoordinated tax rates,[26] the derivative of the welfare function with respect to the trade barrier is relatively simple. The derivative equals

$$\frac{d(D_p^A - D_n^A)}{d\bar{t}} = \frac{\partial D_p^A}{\partial \bar{t}} - \frac{\partial D_n^A}{\partial \bar{t}} - \frac{\partial D_n^A}{\partial \tau_n^B}\frac{\partial \tau_n^B}{\partial \bar{t}} =$$

$$\left(\frac{1}{2} - \frac{\beta_3+\beta_4}{\beta_1+\beta_2}\right)(\beta_1+\beta_1'+\beta_2+\beta_2')cw(\tau_p - \tau_n) \lessgtr 0 \quad \text{if} \quad \tau_p - \tau_n \gtrless 0 \tag{6.22}$$

The first line of this equation shows that there is a direct effect of a change in the trade barrier on the welfare difference and an indirect effect through the change in the noncoordinated tax rate. Because the direct and indirect effect can work in opposite directions, it is necessary to rewrite this equation. This is done in the second row. This

[25] Arnott & Grieson (1981) discuss more extensively the use of taxes if discrimination between home and foreign markets, residents and non-residents or home and foreign producers is not possible.

[26] This implies that $\frac{\partial D_p^A}{\partial \tau_p^A} + \frac{\partial D_p^A}{\partial \tau_p^B} = 0$ and $\frac{\partial D_n^A}{\partial \tau_n^A} = 0$.

expression follows by substituting the term on the left-hand side of the equality sign of equation (6.9) and equation (6.11) in $\frac{\partial D^A}{\partial t}$, and rewriting $\frac{\partial D_n^A}{\partial \tau_n^B}$, using equation (6.18). Manipulation of the coefficients, and using the fact that the tax rates in both countries are identical gives the expression in equation (6.22). It shows that market integration increases the difference in welfare levels, if the tax rates are inefficiently low. If the tax rates are inefficiently high, the difference in welfare levels is reduced.

The results above can be explained by examining the changes in the tax rates, see also subsection 6.5.1. If there is overprovision, the noncoordinated and coordinated tax rate tend to converge (due to market integration) while the tax rates diverge if there is underprovision. These effects underlie the change in the welfare difference. Equation (6.22) also shows that the indirect effect of market integration through the change in the tax rate is always dominated by the direct effect, because $|\frac{\beta_3+\beta_4}{\beta_1+\beta_2}| < \frac{1}{2}$. If there is overprovision market integration reduces, thus, tax competition. It enlarges if there is underprovision. Comparing these results with those in subsection 6.5.1, the analyses using the difference in absolute tax rate levels and the difference in welfare levels give similar results if market integration is represented by lower exogenous trade barriers.

6.5.3 Tax competition measured in welfare terms and endogenous trade barriers

In this subsection trade barriers are endogenous. Market integration is, thus, represented by an increase in cooperation of trade policies. The welfare differential can be written as $D_p^A(\tau_p^A, \tau_p^B, t_p^A, t_p^B) - D_n^A(\tau_n^A, \tau_n^B, t_n^A, t_n^B)$, and the tax rates depend on the endogenous trade barriers. The derivative of this welfare difference with respect to the degree of cooperation is relatively simple by the assumption that countries are identical, and by the optimality of the coordinated and noncoordinated tax rates. It equals

$$\frac{d(D_p^A - D_n^A)}{d\nu} = (1-\nu)\left(\frac{\partial D_p^A}{\partial t_p^B}\frac{\partial t_p^B}{\partial \nu} - \frac{\partial D_n^A}{\partial t_n^B}\frac{\partial t_n^B}{\partial \nu}\right) - \frac{\partial D_n^A}{\partial \tau_n^B}\frac{\partial \tau_n^B}{\partial \nu} \qquad (6.23)$$

Equation (6.23) represents the difference in the derivatives of welfare with respect to the degree of cooperation on tariff policies if redistributive policies are coordinated and not coordinated, respectively. If the sign of equation (6.23) is positive, increasing cooperation exerts an upward effect on the degree of tax competition, otherwise it exerts a downward effect on the degree of tax competition. Before deriving the sign of this equation, we discuss, first, the signs of the derivatives. The first term in equation (6.23) follows from using the fact that tariff policies are partially coordinated. Because $\frac{\partial D^A}{\partial t^B} < 0$, and $\frac{\partial t^B}{\partial \nu} < 0$, increasing cooperation has always a positive effect on welfare if tax policies are coordinated. This is due to the fact that the other country internalizes a greater part of the negative externality.

If tax policies are not coordinated, there is also a positive welfare effect caused by internalizing a larger part of the externality that results from decisions on trade barriers. There exists, however, also an indirect effect induced by the change in the foreign tax rate. If the decrease in tariff rates (due to the increase in cooperation) exerts an upward effect on the redistributive tax rates (which is the case if $\beta_3 + \beta_4 < 0$), and there are inefficiently low redistributive transfers ($\tau_n < \tau_p$), market integration increases welfare, i.e. $\frac{dD_n^A}{dv} > 0$. This result also prevails if there is a downward effect on the tax rate ($\beta_3 + \beta_4 > 0$), and inefficiently high transfers. For the two other possibilities[27] the indirect effect works in the opposite direction of the direct effect. This can lead to the paradoxical result that increasing cooperation affects welfare negatively, because tax competition is heavily intensified. In other words, it follows that substitution of decentralized redistributive policy for tariff policy as an instrument for stimulating home-based industries can reduce and may be even destroy the welfare benefits from cooperation.

Obviously, if $\frac{dD_p^A}{dv} > 0$ and $\frac{dD_n^A}{dv} > 0$, the effect of increasing cooperation on the difference in welfare is ambiguous, see equation (6.23). We can, however, rewrite equation (6.23) by substituting equation (6.9) without equality sign, and (6.11) in the first part, and substituting equation (6.18) and (6.13) in the second part of the expression. As a result,

$$\frac{d(D_p^A - D_n^A)}{dv} = (1-v)\frac{\partial D_p^A}{\partial t_p^B}\left(\frac{\partial t_p}{\partial v} - \frac{\partial t_n}{\partial v}\right) + \Phi\frac{\partial t_n}{\partial v}(\phi_1 + \phi_1' + \phi_2 + \phi_2')cw(\tau_p - \tau_n)$$

$$\Phi \equiv 1 - \frac{2(\beta_3+\beta_4)}{\beta_1+\beta_2} - \frac{\phi_1(v)+\phi_2(v)}{\phi_3(v)}\left(\frac{\phi_3+\phi_3'}{\phi_1+\phi_1'+\phi_2+\phi_2'} - \frac{\beta_3+\beta_4}{\beta_1+\beta_2}\right) > 0 \qquad (6.24)$$

$$\text{if} \quad \phi_1(v) + \phi_2(v) > 0 \quad \vee \quad \beta_3 + \beta_4 > 0$$

Equation (6.24) consists of two terms. The sign of these terms depends on the over- or underprovision of redistributive transfers. In case there is overprovision, the first term is negative, because $\frac{\partial t_p}{\partial v} - \frac{\partial t_n}{\partial v}$ has a negative sign, see appendix 6.3. The second term is also negative, if $\Phi > 0$.[28] Thus, more cooperative tariff policies reduces the welfare

[27] That is to say, first, $\beta_3 + \beta_4 < 0$ and overprovision, and, second, $\beta_3 + \beta_4 > 0$, and underprovision.

[28] However, if there are many firms ($\beta_3 + \beta_4 < 0$), such that increased cooperation exerts an upward effect on the tax rate (see section 6.4) which is enlarged by even lower trade barriers ($\phi_1(v) + \phi_2(v) < 0$), it cannot be excluded that the externality of the noncoordinated tax rates is enlarged in such way that the welfare differential is increased.

differential. If transfers are overprovided, more cooperation on trade barrier policies will reduce tax competition in the field of redistributive taxes. The reduction of the welfare differential can be explained by the convergence of the noncoordinated tax rate to the coordinated one, see subsection 6.5.1.

If redistributive transfers are underprovided, the second term of equation (6.24) is positive ($\Phi > 0$). The first term is positive if $\frac{\partial t_p}{\partial v} > \frac{\partial t_n}{\partial v}$. Then, an increase in cooperation raises the welfare differential. In this situation tax competition is increased, and also the welfare gains of coordinating redistributive policies.

The first term will be positive if $\phi_1(v)+\phi_2(v)<0$, otherwise the sign of $\frac{\partial t_p}{\partial v} - \frac{\partial t_n}{\partial v}$ is ambiguous. This is due to two opposing effects. On the one hand, the gap between the trade barriers is reduced, because the reduction of trade barriers is larger in the coordinated case. On the other hand, (through the change in the trade barriers) the coordinated tax rate raises relatively to the noncoordinated one, which has an upward effect on the gap between both endogenous trade barriers if $\phi_1(v)+\phi_2(v)>0$. It is not possible to determine the dominance of one of these two effects. The analysis does show, however, that if integration is going on such that in the end nearly all trade barriers are eliminated ($\phi_1(v)+\phi_2(v)<0$), tax competition with respect to redistributive policy will increase.

From the analyses it follows that by the restrictions on tariff policy countries have less possibilities to use the tariff rate in order to protect their industries at the home market. If tariff rates are exogenous it is even completely ruled out. In response to such tariff agreements they lower the decentralized tax rates or raise them more modestly than with a coordinated redistributive policy irrespective whether there is initially overprovision or underprovision of redistributive transfers. This reduces labour costs, and improves competitiveness of their firms at home and abroad. In a way there is a shift from the trade barriers as an instrument for policy competition to the redistributive tax rates. If there is overprovision of redistributive transfers this is welfare enhancing, while it harms welfare if redistributive transfers are underprovided. Then, coordination would improve welfare.

Note, that in the underprovision case an increase in cooperation can decrease tax competition according to the criterium in welfare terms, while it increases according to the criterium in tax rate levels. This is due to the spillovers between redistributive and tariff policy. One can doubt whether this result is very plausible, but it does show that due to spillovers increasing differences between the coordinated and noncoordinated tax rates do not necessarily increase the welfare gains of coordination.

6.6 Conclusions

This chapter examined the hypothesis that cooperation on tariff/trade barrier policies has spillovers to other government policies. Agreements on market integration restrict the possibilities of countries to use trade barriers as protective instrument for home-based industries, and thereby employment, but do not destroy countries' incentives to use protective instruments. Therefore, they use other policy instruments. The policy area chosen here is redistribution. Not because it is the only possibility, but it is the one that is most under debate now, in particular in the northern member states of the EU.

The question of whether market integration would increase the competitive element of redistributive policies was addressed in a two-country model with trade. Welfare consists of the utilities of workers and producers with different political weights. Optimal tariff and redistributive policies are derived from maximising this welfare function. It follows that workers benefit from redistribution, while producers gain from trade barriers, because these protect their home markets from foreign competition. Linear demand curves (based on quadratic utility functions) are introduced to facilitate the analysis and to derive explicit expressions for the optimal tariff and tax rate. Although this set up is restrictive, it opens the possibility to present clearly the relevant mechanisms at work, which is the main aim of this chapter.

Increasing market integration is represented in two ways: first, by lower exogenous trade barriers, and second, by an increase in cooperation, that is to say countries are more willing to take into account (partially) the externalities of trade barrier decisions.

Table 6.2 Increasing market integration and tax competition

Tax competition effects		Measures of tax competition			
Difference in:		tax rate levels		welfare levels	
Provision of transfers:		under	over	under	over
Measures market integration:	lower exogenous tariffs	increase	decrease	increase	decrease
	increasing cooperation	increase	decrease	increase[1,2]	decrease[1]

[1] not proved if $\phi_1(v)+\phi_2(v)<0$, and $\beta_3+\beta_4<0$.
[2] not proved if $t_p - t_n$ is increased.

Furthermore, we have to put the notion of tax competition into practice. The concept of tax competition suggests two possible proxies: one that measures the difference in tax rates levels in the case these tax rates are determined coordinately (taking into account the externalities) and noncoordinately, and one that measures the difference in welfare levels. So, in total we have four methods to measure the change in tax competition due to market integration, see table 6.2.

From this table it is concluded that lower trade barriers, whether specifically agreed upon or the result of increasing cooperation, tends to increase tax competition in the underprovision case. This result suggests that the welfare benefits of increasing cooperation in one field are partially crowded out by increased competition in other fields. In the overprovision case tax rates tend to converge to each other which reduces the welfare differential. Then, tax competition is decreased, which is welfare improving. The welfare benefits from increasing cooperation are, thus, reinforced by the decrease in tax competition.

All these effects are caused by changes in trade barriers that lower the noncoordinated redistributive tax rates or raise them less than the coordinated tax rates. If the integration process is just started, these spillovers can be welfare improving (overprovision). In the long run, however, if markets are already liberalized to a certain degree, the spillovers increase tax competition (underprovision). This enlarges the scope for international coordination of redistributive policies. Thus, there is indeed a shift from tariff to redistributive policy as competitive policy instrument. As long as the spillovers between tariff and redistributive policies do exist, the Siamese twin can not be separated.

The European Union seems to be aware of spillovers on the fields of corporate taxes and indirect taxes in view of the agreements on harmonising value added taxes to some extent, and the policy advices to agree on minimum corporate tax rate levels. Redistribution between richer and poorer people, however, has no priority at the EU level, but is mainly a national issue. This analysis suggest that some coordination at EU level is desirable, in particular if there are inefficiently low redistributive transfers. May be more attention has to be paid by the EU on this issue to avoid the erosion of benefit levels, and welfare benefits from cooperation in other fields due to competitive behaviour of member states using the redistributive tax rate as a policy instrument.

Appendix 6.1 The Coefficients in the First-order Conditions for the Tariff Rates

This appendix presents the expressions for the coefficients, ϕ_i and ϕ_i', in equation (6.9) and (6.11), respectively. For that purpose the expressions for employment and profit are substituted in equation (6.8) and (6.10). As a result,

$$\frac{dD^A}{dt^A} = -(\xi-1)\alpha\left(X^A\frac{\partial p_x^A}{\partial t^A}+Y^A\frac{\partial p_y^A}{\partial t^A}\right) - Y^A\frac{\partial p_y^A}{\partial t^A} + (\xi-1)cw(1+\tau^A)\frac{\partial X^A}{\partial t^A}$$

$$+ \xi t^A\frac{\partial Y^A}{\partial t^A} + (\xi-1)(1-\alpha)Y^A + p_x^A\frac{\partial X^A}{\partial t^A} = 0$$

$$\frac{dD^B}{dt^A} = (\xi-1)cw(1+\tau^B)\frac{\partial Y^A}{\partial t^A} + p_y^A\frac{\partial Y^A}{\partial t^A} + Y^A\frac{\partial p_y^A}{\partial t^A} > 0$$

After substitution of the price and demand equations and their derivatives in the two equations above, it is possible to derive the coefficients. Note that all expressions have to be divided by $\frac{nBG}{\psi^2}$, and that $\xi > 1$. Furthermore it is assumed that $n^2B-b-1 > 0$ and $nb \geq n+b+1$.

$$\phi_0 = (n+b+1)a[\ -(\xi-1)\alpha nB(n+b+1) + (nB+1)(b+1) + (\xi-1)(nB+1)(n+b+1)\ ] > 0$$

$$\phi_1 = nb[\ (2\xi-1)(nB+1)(n+b+1) - (\xi-1)\alpha(n^2B-b-1)\ ] > 0$$

$$\phi_2 = (\xi-1)\alpha[n(nB+b+1)(n+1)(b+1)-n^2b^2] + [n(nB+b+1)(n+1)(b+1)+n^2b^2] -$$

$$\xi(nB+1)(n+b+1)(n+1)(b+1) < 0$$

$$\phi_3 = \phi_2 - \xi(nB+1)(n+b+1)(n+1)(b+1) < 0$$

$$\phi_0' = -2a(n+b+1)(n+1)(b+1) < 0$$

$$\phi_1' = -2nb(n+1)(b+1) < 0$$

$$\phi_2' = (n+1)(b+1)[\ (1-\xi)(nB+1)(n+b+1) - (n^2B-b-1)\ ] < 0$$

$$\phi_3' = 2(n+1)^2(b+1)^2 > 0$$

Appendix 6.2 The Coefficients in the First-order Conditions for the Tax Rates

This appendix presents the expressions for the β_i and β_i', in equation (6.15) and (6.18), respectively. As in appendix 6.1 the expressions for employment and profit are substituted in equation (6.14) and (6.19). As a result,

$$\frac{dD^A}{d\tau^A} = -(\xi-1)\alpha\left(X^A\frac{\partial p_x^A}{\partial \tau^A}+Y^A\frac{\partial p_y^A}{\partial \tau^A}\right) + X^B\frac{\partial p_x^B}{\partial \tau^A} - Y^A\frac{\partial p_y^A}{\partial \tau^A} + (\xi-1)w(c_0+cX^A+cX^B) +$$

$$(\xi-1)cw(1+\tau^A)\frac{\partial(X^A+X^B)}{\partial \tau^A} + \xi t^A\frac{\partial Y^A}{\partial \tau^A} + p_x^A\frac{\partial X^A}{\partial \tau^A} + p_x^B\frac{\partial X^B}{\partial \tau^A} = 0$$

$$\frac{dD^B}{d\tau^A} = -(\xi-1)\alpha\left(Y^B\frac{\partial p_y^B}{\partial\tau^A} + X^B\frac{\partial p_x^B}{\partial\tau^A}\right) + Y^A\frac{\partial p_y^A}{\partial\tau^A} - X^B\frac{\partial p_x^B}{\partial\tau^A} +$$

$$(\xi-1)cw(1+\tau^B)\frac{\partial(Y^A+Y^B)}{\partial\tau^A} + \xi t^B\frac{\partial X^B}{\partial\tau^A} + p_y^A\frac{\partial Y^A}{\partial\tau^A} + p_y^B\frac{\partial Y^B}{\partial\tau^A}$$

After substitution of the price and demand equations and their derivatives in the two equations above it is possible to derive the coefficients. Note that all expressions have to be divided by $\frac{nBG}{\psi^2}$, and that $\xi > 1$. Furthermore it is assumed that $n^2B-b-1 > 0$ and $nb \geq n+b+1$.

$$\beta_0 = \frac{(\xi-1)c_0\Delta^2}{cnBG} + (n+b+1)a\ [\ -(\xi-1)\alpha nB(n+b+1) + n(nB+1) +$$

$$2(\xi-1)(nB+1)(n+b+1) - 2(n+1)(b+1)\ ]$$

It is assumed that $\beta_0 > 0$. Even the term in brackets would have a negative sign, it is assumed that the first part with the fixed costs dominates.

$$\beta_1 = (\xi-1)\alpha[n(nB+b+1)(n+1)(b+1)-n^2b^2] - n^2b^2-3n(nB+b+1)(n+1)(b+1)) +$$

$$4(1-\xi)(nB+1)(n+b+1)(b+1)(n+1) < 0$$

$$\beta_2 = nb[(-(\xi-1)\alpha+1)(n^2B-b-1) + 2(\xi-1)(nB+1)(n+b+1)] > 0$$

$$\beta_0' = an(n+b+1)[\ -(nB-2b+1) - (\xi-1)\alpha B(n+b+1)\ ]$$

$$\beta_1' = (\xi-1)\alpha[n(nB+b+1)(n+1)(b+1)-n^2b^2] + n(nB+b+1)(n+1)(b+1)+3n^2b^2 > 0$$

$$\beta_2' = \beta_2, \quad \beta_3 = \phi_1, \quad \beta_4 = \phi_2', \quad \beta_3' = \phi_1', \quad \beta_4' = \phi_2$$

Appendix 6.3 Increasing Cooperation and Trade Barriers

This appendix derives that $-\frac{1}{2}\frac{\partial t_p}{\partial v} - \frac{\beta_3+\beta_4}{\beta_1+\beta_2}\frac{\partial t_n}{\partial v} > 0$ if $T_p - T_n > 0$. Starting from the expression for the tariff rate, as in equation (6.13), differentiation to v gives

$$\frac{\partial t_i}{\partial v} = \frac{\phi_0\phi_3'-\phi_0'\phi_3 + \left((\phi_1+\phi_2)\phi_3'-(\phi_1'+\phi_2')\phi_3\right)T_i}{\phi_3(v)\left(\phi_3(v) + (\phi_1(v)+\phi_2(v))\frac{\partial T_i}{\partial t_i}\right)} \qquad i = n,p$$

Here we also take into account the effects on the tax rate induced by changes in v. From appendix 6.1 it is derived that $\phi_0\phi_3'-\phi_0'\phi_3 < 0$, and $(\phi_1+\phi_2)\phi_3'-(\phi_1'+\phi_2')\phi_3 < 0$. So, the numerator has a negative sign. Because $|\phi_3(v)| > |\phi_1(v)+\phi_2(v)|$, and $|\frac{\partial T_p}{\partial t_p} = -\frac{1}{2}| > |\frac{\partial T_n}{\partial t_n} = -\frac{\beta_3+\beta_4}{\beta_1+\beta_2}|$, the term in brackets in the denominator has also a negative sign. Based on these results, it follows that $\frac{\partial t_i}{\partial v} < 0$. Differentiation of this expression gives $\frac{\partial^2 t_i}{\partial v^2} < 0$. So, the more integration proceeds the faster trade barriers will diminish.

Noting that $T_p - T_n > 0$, the absolute value of the numerator is larger in the coordinated case. The absolute value of the multiplicative term combined with the denominator is also larger in that case. As a result, $-\frac{1}{2}\frac{\partial t_p}{\partial v} - \frac{\beta_3+\beta_4}{\beta_1+\beta_2}\frac{\partial t_n}{\partial v} > 0$. The result is ambiguous if $T_p - T_n < 0$. Then, it follows that $\frac{\partial t_p}{\partial v} - \frac{\partial t_n}{\partial v} > 0$. The change of the trade barrier is, thus, larger in the noncoordinated case. However, the effect of a change in the trade barrier on the tax rate is smaller than in the coordinated case. These two opposite effects underlie this ambiguous result.

Appendix 6.4 The Coefficient ψ_0

In equation (6.20) the coefficient ψ_0 is introduced. Its definition is

$$\psi_0 = -\frac{\beta_0 + \beta_0'}{\beta_1 + \beta_1' + \beta_2 + \beta_2'} + \frac{\beta_0}{\beta_1 + \beta_2} > 0$$

With the help of the expressions for the coefficients in appendix 6.1 it is proved that the coefficient has a positive sign.

Chapter 7

Government Investment and Economic Growth[1]

7.1 Introduction

This chapter examines the relation between capital mobility, economic growth, government investment and redistribution. Chapter 4 concluded that capital mobility will lead to social dumping if the financing of the social insurance system affects the return on capital. Countries have the incentive to lower these taxes in order to attract capital. However, this theory takes no account of the dynamic effects of capital accumulation. This chapter does take account of these effects. It shows that this extension of the model affects the results with respect to the provision of social insurance in a crucial way. In particular, if fiscal policy affect economic growth abroad negatively, decentralized fiscal policy could lead to inefficiently high tax rates. Then, low tax rates could stimulate growth and due to the transmission by the international capital market stimulate also economic growth in other countries. This externality works in the opposite direction of the traditional externality on the tax base. By the extension of the standard tax competition model with respect to time, there seems to appear a trade off between these externalities. Here, we question of whether capital income taxes are still inefficiently low in a dynamic model.

Our dynamic model is an endogenous growth model. Recently, the relation between (endogenous) growth, political influence and redistribution has been widely examined within countries.[2] Our model is most closely related to Alesina & Rodrick (1991). As in our model, taxes are levied on capital owners. Tax contributions are used for government investment to boost production, and redistributive transfers to the workers. If the government represents only the interests of capital owners, there will be no redistribution and government investment will maximise economic growth. However, if workers also have political influence, government investment will exceed the level that guarantees optimal growth and redistributive transfers will exist. Our model extends the model of Alesina & Rodrick (1991) to a two-country model with imperfect capital mobility.

Two-country endogenous growth models are also presented by Devereux & Mansoorian (1992), and Razin & Yuen (1993). Our model deviates substantially from these models. First, we have imperfect capital mobility between the countries and no trade. Second, there are two policy instruments and we also consider the case that only one of the two policy instruments is coordinated (partial coordination). Due to the spillovers between both policy areas it is possible that partial coordination does not reduce the

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[1]This chapter is nearly identical to Lejour & Verbon (1995b).

[2]See among others Perotti (1993), Alesina & Rodrick (1994) and Persson & Tabellini (1994).

external welfare effects of noncoordinated decision making. This issue is not widely discussed because most models consider only the external welfare effects of one policy instrument. Third, we examine the consequences of increasing capital mobility on the level of redistribution, investment and economic growth.

Our model shows that there will appear tax competition. The rate of investment and redistribution will be inefficiently high or low - depending on the two external welfare effects mentioned before. The dominance of one of these two externalities depends on the rate of time preference, and the incentives of capital owners to invest abroad. In case there is overprovision, growth rates will be inefficiently low. However, this result is reversed, if there is underprovision of transfers and investment. Starting from non-coordinated policies, partial coordination of redistributive policies tends to direct the level of redistribution in the right direction but too far, while investment policy will be even more inefficient than in the noncoordinated case. The rate of economic growth and the tax rate, however, changes in the direction of the Pareto-efficient level. On net, the external welfare effects are diminished.

Further integration of capital markets will increase the inefficient use of both government instruments if policies are not coordinated or partially coordinated. Depending on the initial situation of under- or overprovision, capital market integration exerts a downward or upward effect, respectively, on the rate of government investment and redistribution in the noncoordinated case. These results suggest that coordination of both policies becomes more desirable if capital market integration proceeds.

Section 7.2 presents the model. Section 7.3 discusses the differences between the fiscal policies within a country whether capital owners or workers have decisive political power. This section also derives the Nash equilibrium and the reaction curves. Section 7.4 compares this equilibrium with the case that government policies are fully coordinated between the countries, and analyses the issue of tax competition. Both cases are compared with the situation in which countries decide to coordinate redistributive policies only in section 7.5. Section 7.6 examines the consequences of increasing capital mobility on both policy areas and economic growth. Section 7.7 concludes.

7.2 The Model

This section presents the outline of our two-country model that is based on Alesina & Rodrick (1991) and chapter 4. In each country there are two groups, capitalists and workers, employed or non-employed. There is redistribution from capitalists to workers

based on a source based tax on capital income.[3] Tax contributions, which are not used for redistribution, are used to finance government investment in infrastructure, schooling and the like to stimulate production in case of positive production externalities. The governments' budget constraint reads[4]

$$\tau_c^A r^A K^{dA} = (1-p) H_l^A \eta^{/A} + G^A \qquad K^{dA} = H_c^A k^{AA} + H_c^B k^{BA} \tag{7.1}$$

Capital income is taxed in country A at the source at the rate τ_c. Capital that is invested within country A originates from capitalists residing in country A, k^{AA}, and in country B, k^{BA}. H_l and H_c represent the number of workers and capitalists, respectively. The superscripts refer to the country of residence. p represents the share of workers that are employed and receives labour income, w. The share of workers that are non-employed, $1-p$, receives a benefit, η'. G represents government spending on investment. For analytical convenience the budget constraint is rewritten as

$$\tau_c = \eta + g \qquad \eta \equiv \frac{(1-p) H_l \eta'}{r K^d} \qquad g \equiv \frac{G}{r K^d} \tag{7.2}$$

η and g represent the ratio of government expenditures on redistribution and investment to capital income, respectively. We label these variables as the rate of redistribution and investment.

Workers maximise their expected utility, according to the following expected utility function.

$$E(U^L) = \int_0^{\infty} (p\,U(w) + (1-p)\,U(\eta))\; e^{-\rho t}\, dt \tag{7.3}$$

It is assumed that labour supply is fixed, and that the probability of being employed is exogenous.[5] Employed and non-employed workers do not save, but spend their whole income on consumption goods.

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[3]This is a short cut for modelling the shift of the tax workers' burden to capitalists in economies in which labour supply is endogenous or the labour market is distorted (e.g. due to wage bargaining), see Alesina & Rodrick (1994) for a more extensive discussion on this issue.

[4]We present only the equations for one country. If it is not confusing we drop the superscripts that refer to country-specific variables.

[5]The model is simplified compared to chapter 4, in which the probability of being employed is endogenised. That is more realistic, but makes no significant contribution to the analysis here.

Capitalists posses capital and maximise their utility, U^C, by determining the amount of investment and its location. In equilibrium the returns on investment at home and abroad have to be equal to exclude the possibility that all investment is located in one country. Because capitalists are in general less informed about investment opportunities and its risks abroad, they want a higher return on investment abroad to cover this risk. Gordon & Bovenberg (1994) argue that there is asymmetric information between countries. Capital owners do know much more about economic prospects in general, and about specific industries and firms in their own country, than they do about other countries. If they want to invest abroad they are at a disadvantageous position compared to local investors. More specifically, Persson & Tabellini (1992) and Gordon & Bovenberg (1994) argue that foreign investors have to learn the features of foreign contract law, the tax system, and to deal with foreign banks, the foreign distribution system, foreign labour markets, and so on.

We label the extra costs associated with investment abroad as mobility costs, as in Persson & Tabellini (1992). The assumption that the mobility costs have to be convex in the amount of investment abroad is necessary to guarantee equal returns on capital in both countries at the margin because there are no diminishing returns on capital in endogenous growth models. It implies that capital owners are indifferent between investing at home and abroad at the margin. As a result, the total capital stock in the economic union is spread out over both countries. Note that this assumption is comparable to the stability condition in Stiglitz (1977), who discusses the stability properties of migration.

The assumption that the mobility costs have to be convex does not fully correspond to the situation that a lot of these costs seem to be fixed and do not vary with the amount of foreign investment. However, the mobility costs can also be interpreted in another way. Assume that the capital owners are heterogenous, in particular with respect to their attitude to risk aversion, and their capacity to adapt to other circumstances, and that the distribution of these characteristics is not uniformly spread out over all capital owners, but unevenly such that most of the capital owners have a more than average degree of risk aversion, and less capacity to adapt. Then, first the most flexible, risk-loving capital owners would choose to invest abroad. Later on, more risk-averse, less flexible capital owners would follow. Given that each capital owner has only a limited amount of money to invest, the mobility costs will rise increasingly if more money is invested abroad, because the more risk-averse, less flexible capital owners 'demand' a higher risk premium. They need a larger incentive to invest abroad, so the difference between both after-tax returns on capital in both countries has to be larger.

At the margin these differences in the return on capital will equalize the mobility costs. Otherwise, all capital would flow to one country which is not of much interest for the analysis. Capital owners residing in country A invest in country B until

$$(1-\tau_c^A)r^A = (1-\tau_c^B)r^B - M(K^{AB}/K_s^A) \qquad M(K^{AB}/K_s^A) \equiv -\nu^A + \mu K^{AB}/K_s^A \quad (7.4)$$

$\nu^A, \mu > 0$. This mobility cost function is based on Persson & Tabellini (1991). $M(\,)$ represents the mobility costs per unit of investment. Multiplying these costs with the amount of foreign investment gives the convex function of total mobility costs. Note, that this specification allows for bidirectional capital flows even if the after-tax returns on capital are equal in both countries. The parameter ν represents other possible incentives to invest abroad, except for exploitation of differences in after-tax returns on capital. These could be strategic motives for penetrating in other countries, a more attractive regulatory framework, and the like. The parameter μ represents the marginal mobility costs. A decrease in this parameter could be interpreted as a liberalization of capital markets that makes foreign investment more convenient.

Labour, capital, and government investment serve as inputs in the production function. Here we follow Alesina & Rodrick (1991) who model production as

$$Y = (pH_l)^{\alpha}(K^d)^{1-\alpha}G^{\alpha} \quad (7.5)$$

Returns on labour and capital are determined by profit maximisation, and are equal to

$$w = \frac{\partial Y}{\partial pH_l} = \frac{\alpha Y}{pH_l} = \alpha(pH_l)^{\alpha-1}(gr)^{\alpha}K^d \quad (7.6)$$

$$r = \frac{\partial Y}{\partial K^d} \quad \Rightarrow \quad r = \left((1-\alpha)(pH_l g)^{\alpha}\right)^{\frac{1}{1-\alpha}} \quad (7.7)$$

The size of the total labour force is exogenous, so the level of employment is fixed. It follows that the gross return on capital is fixed by the parameters in the production function, the labour force, and government investment. The wage rate, w, depends linearly on the capital stock within the country.

At the start of the optimization period the existing stock of capital is given, $K_s(0) = H_c k_s(0)$. The distribution of this stock over home and foreign investments is determined by the

capital mobility condition, equation (7.4). From this equation we derive $K_s^{AA}(0)$, and $K_s^{AB}(0)$. The optimisation problem of the representative capitalist reads

$$U^{CA} = \int_0^{\infty} U(c^{CA})\, e^{-\rho t} dt \tag{7.8}$$

$$s.t. \quad \dot{k}_s^A = \dot{k}^{AA} + \dot{k}^{AB} = (1-\tau_c^A) r^A k^{AA} + \left((1-\tau_c^B) r^B - M(K^{AB}/K_s^A)\right) k^{AB} - c^{CA} \tag{7.9}$$

$$\lim_{t\to\infty} k_t^{AA} \lambda_t^A = \lim_{t\to\infty} k_t^{AB} \lambda_t^B = 0 \tag{7.10}$$

c^{CA} represents the consumption level of a capital owner residing in country A. λ_t^A and λ_t^B are the positive costate variables. The capital mobility condition, equation (7.4), has to be added to these restrictions. Straightforward maximisation of capitalists' utility implies that the growth rate, π^A, is equal to

$$\pi^A \equiv \frac{\dot{c}^{CA}}{c^{CA}} = \sigma((1-\tau_c^A) r^A - \rho) \tag{7.11}$$

Assuming that the utility function is of the CRRA type, the elasticity of marginal utility with respect to consumption, σ, is constant. Workers' consumption does not necessarily grow at the same speed as the consumption possibilities of capital owners. Workers' income, whether employed or not, depends linearly on the capital stock within the country. The growth rate of this capital stock is an average of the growth rates of the capital possessed by home and foreign capitalists, weighted by the amount of home and foreign investment within a country (see equation (7.12))

$$\pi_L^A \equiv \frac{\dot{c}^{LA}}{c^{LA}} = \frac{\dot{c}^{UA}}{c^{UA}} = \frac{\dot{K}^{dA}}{K^{dA}} = \frac{K^{AA}\pi^A + K^{BA}\pi^B}{K^{dA}} \tag{7.12}$$

Investment by country B in country A grows at the same speed as the growth of the capitalists' consumption possibilities in country B. The growth rates in both countries can differ, because of differences in time preferences or government policies. Because investment from abroad can grow at a different rate there is not necessarily balanced growth within a country, as can be shown by using the resource constraints. For balanced growth within a country the inward capital flow has to grow at the same speed as GDP and vice versa. Then, the capital mobility condition is also satisfied. So, there can only be balanced growth within each country if the growth rates of both countries

are equal. If this is not the case, one country would grow faster than the other one. In the end, the country with the lower growth rate would be infinitely small compared to the other country. Razin & Yuen (1993) derive a similar result in their two-country endogenous growth model. From now on, we will assume that both countries are identical. So, *ex post* the growth rates will be similar.

The assumption of identical countries also implies that *ex post* the growth rates of capitalists and workers, whether they are employed or not, are similar. However, *ex ante* that is not the case. The growth rate of capital invested within a country depends on the growth rates of capital supplied by home and foreign capitalists. This causes the differences between noncoordinated and coordinated government policies, as we will see later on.

7.3 The Nash Equilibrium

In this and the subsequent sections we will distinguish the case in which the governments of both countries coordinate policies from the case in which they do not coordinate. This section concentrates on the case in which governments take the actions of the foreign government as given and do not care about foreign welfare. First, we study only the optimal rate of investment and redistribution for one country. Second, we analyse the Nash equilibrium. This equilibrium will be compared with the coordinated equilibrium in section 7.4 and the partially coordinated equilibrium in section 7.5. These comparisons are made in order to examine whether the rate of government investment, redistribution and economic growth are inefficiently low or high in the Nash equilibrium.

Governments have two policy instruments, the benefit rate and the rate of government investment. The level of the capital income tax follows automatically from the budget constraint, equation (7.2). In analyzing the governments' problem it is useful to study, first, the behaviour of a government that only represents the interests of residing capital owners. Then, the optimization problem reads

$$\max_{g^A,\eta^A} \quad D^A = U^{CA} = \int_0^\infty U(c^{CA})\, e^{-\rho t} dt \tag{7.13}$$

$$s.t. \quad c^{CA} = (1-\tau_c^A) r^A k^{AA} + \left((1-\tau_c^B) r^B - M(K^{AB}/K_s^A)\right) k^{AB} - \pi^A k_s^A - \pi^B k_s^B \tag{7.14}$$

π^I is defined in equation (7.11) for I = A,B, and k^{AI} is a linear function of K_s^A as can be seen by using the mobility costs equation, equation (7.4). The parameter ρ represents

the rate of time preference. Welfare of capital owners is maximized if the after-tax rate of return on capital is optimal. Government influences the return on capital by both policy instruments. Differentiating the after-tax rate of return on capital with respect to the two policy instruments gives[6]

$$\frac{\partial((1-\tau_c^A)r^A)}{\partial g^A} = r^A\left(-1 + \frac{(1-\tau^A)\alpha}{(1-\alpha)g^A}\right) = 0 \quad \Rightarrow \quad g^A = \alpha(1-\eta^A) \tag{7.15}$$

$$\frac{\partial((1-\tau_c^A)r^A)}{\partial \eta^A} = -r^A < 0 \tag{7.16}$$

From equation (7.16) it follows that capital owners have no interest in redistribution. Assuming that the amount of redistribution cannot be negative, it follows that $\eta^A = 0$ and $g^A = \alpha$. Thus, we have the familiar result that the rate of investment equals the share of public goods in the production function, see Alesina & Rodrick (1991), and Barro & Xala-i-Martin (1992). The same result would follow if governments maximise the rate of economic growth. Capital owners are interested in maximising economic growth, because the return to capital is optimal in that case. A country that only represents the interests of capital owners, thus, maximises economic growth. We will use this result as a reference point if the government represents also the interests of workers.

Now we turn to the case that the government only represents the interests of workers.[7] This is not the most realistic case, but the results of the optimisation problem in which the government represents only the interests of workers will show that the inclusion of the interests of capital owners in the welfare function does not add much to the analysis. After examining the case in which the representative worker is decisive in policy issues, we will discuss briefly the case in which workers and capital owners have both political influence.

If the representative worker is decisive, the optimization problem reads

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[6]This way of solving the optimization problem of the government is a short cut for differentiating the Hamiltonian with respect to both government instruments and the supply of capital. This would give a system of three first-order conditions in which both policy instruments and the costate variables are determined. This system is solved by following the method described in the appendix for the solution of the next optimization problems. As a result, we get equation (7.15) and (7.16).

[7]This could be the case if each capital owner and each worker have equal political influence (one man, one vote), and the homogenous group of workers has an electoral majority. According to the simple majority rule, the representative worker is decisive in policy issues.

$$\underset{g^A,\eta^A}{\text{Max}}\ D^A = H_l \int_0^{\infty} \left(p\,U(w^A) + (1-p)\,U(Pw^A\eta^A)\right)\exp^{-\rho t}dt \qquad P \equiv \frac{p(1-\alpha)}{(1-p)\alpha} \tag{7.17}$$

$$w^A = \alpha(1-\alpha)^{\frac{\alpha}{1-\alpha}}(pH_l)^{\frac{\alpha}{1-\alpha}-1}(g^A)^{\frac{\alpha}{1-\alpha}}K^{dA} \tag{7.18}$$

$$K^{dA} = K_s^A\left(1 - \frac{(1-\tau_c^B)r^B - (1-\tau_c^A)r^A + v^A}{\mu}\right) + K_s^B\left(\frac{(1-\tau_c^A)r^A - (1-\tau_c^B)r^B + v^B}{\mu}\right) \tag{7.19}$$

$$\dot{K}_s^I = \pi^I K_s^I \qquad I = A,\ B \tag{7.20}$$

$$\pi^I = \sigma\left((1-\tau_c^I)r^I - \rho^I\right) \qquad I = A,\ B \tag{7.21}$$

Equation (7.18) follows by substituting equation (7.7) into (7.6). Equation (7.19) is derived by using the definition of K^{dA} and equation (7.4) to determine the share of foreign investment. Assuming that the utility functions are logarithmic, the Hamiltonian of this problem is written as follows

$$\begin{aligned} H^{nA} = {} & H_l\left(\ln\left(\frac{w^A}{K^{dA}}(g^A)\right) + (1-p)\ln(P\eta^A) + \ln(K^{dA}(\eta^A,g^A))\right)\exp^{-\rho t} \\ & + \lambda^A\pi^A(\eta^A,g^A)K_s^A + \lambda^B\pi^B(\eta^A,g^A)K_s^B \end{aligned} \tag{7.22}$$

where λ^A and λ^B are the positive costate variables. The necessary conditions for an optimum are given by

$$H_g^{nA} = H_l\left(\alpha + \frac{K_s^A + K_s^B}{\mu K^{dA}}r^A(\alpha(1-\eta^A) - g^A)\right)\exp^{-\rho t} + \lambda^A K_s^A r^A(\alpha(1-\eta^A) - g^A) = 0 \tag{7.23}$$

$$H_\eta^{nA} = H_l\left(\frac{1-p}{\eta} - \frac{(K_s^A + K_s^B)}{\mu K^{dA}}r^A\right)\exp^{-\rho t} - \lambda^A K_s^A r^A = 0 \tag{7.24}$$

$$-H_{K_s^I} = -H_l\frac{K^{IA}}{K_s^I}\exp^{-\rho t} - \lambda^I\pi^I = \dot{\lambda}^I \qquad I = A,B \tag{7.25}$$

From equation (7.23) it follows immediately that $\frac{\partial(1-\tau_c^A)r^A}{\partial g} \propto r^A(\alpha(1-\eta^A) - g^A) < 0$. So, the rate of government investment exceeds the rate that is necessary to obtain

maximal growth. Equation (7.24) implies that the benefit rate is always positive. More explicit results are derived by substituting equation (7.23) in (7.24) to eliminate the costate variable. As a result,

$$\eta^A = \frac{1-p}{p}\frac{g^A-\alpha}{\alpha} \tag{7.26}$$

This equation implies that the benefit rate is positively related to the rate of investment if $g^A-\alpha > 0$. In addition, the expenditures on redistribution depend positively on the number of non-employed relative to those who are employed. If we assume that the countries are identical, and manipulate the first-order condition, equation (7.23), and substitute equation (7.25) (see appendix 7), the rate of government investment can be written implicitly as

$$G(g^A) \equiv (g^A-\alpha)(g^A)^{\frac{\alpha}{1-\alpha}} = \beta\rho\alpha p\left((1-\alpha)(pH_l)^{\alpha}\right)^{\frac{1}{\alpha-1}} \qquad \beta \equiv \mu(2\rho+\mu-\nu)^{-1} \tag{7.27}$$

Because $\beta > 0$, it follows that the rate of government investment exceeds α. So, the rate of government investment is higher than is necessary to maximise economic growth. Workers want more government investment, because it increases the return on labour, and opposite to capital owners, they do not pay taxes. Workers have also an interest in positive transfers, because they need income in times that they are not employed. Note that $G(\ )$ depends positively on the rate of investment.

Given these results, we turn briefly to the case that capital owners and workers both have political influence. Then, the government takes account of the preferences of capital owners for a rate of investment that maximises economic growth and no redistribution, and the preferences of workers for more investment and redistribution. Government policy will be a mix of these preferences. So, there will be redistribution, and investment above the growth-maximizing level, but less than workers prefer.

For the characterisation of the Nash equilibrium, we analyse the reactions of the government to changes in the foreign rate of investment and redistribution. Note that the result in equation (7.27) was derived by assuming that countries are identical. By this assumption it seems that government investment does not depend on foreign fiscal policy. However, this is misleading as the analysis will show.

The slopes of the reaction curves are expressed in changes in the rate of investment of both countries. The analysis is simplified, because the relation between the rate of redistribution and government investment as in equation (7.26) still holds. This relation

implies that changes in both policy variables of one country work in the same direction. We differentiate equation (7.23) with respect to both investment variables taking into account the changes in the rate of redistribution. In this procedure we assume that both countries are identical; see appendix 7. It follows that the relation between changes in the rate of government investments at home and abroad is positive. The reaction curves have, thus, a positive slope. Moreover, the slope of country A's reaction curve is larger than one. Similarly, the slope of country B's reaction curve is smaller than one. This implies that the reaction curves intersect at most once, so there is at most one Nash equilibrium.

7.4 The Coordinated Equilibrium

As is well known, noncoordinated fiscal policies under the Nash equilibrium are in general not efficient due to the external effects of decision making. Member states do not take into account the beneficial or harmful effects that accrue to other member states due to their fiscal policy. In this model foreign welfare is affected by two policy instruments: the rate of government investment and redistribution. The fiscal externalities could be corrected if countries would coordinate policies, that is to say countries decide autonomously on the level of social insurance, but in a mutual action with the other member states determine their policies such that the reciprocal external effects are effectively taken into account. This issue is especially relevant for the situation in the EU. Given the absence of a central authority the externalities can be internalized only if the countries voluntarily coordinate their decisions. They maximize

$$\underset{g^I,\eta^I}{\text{Max}} \quad D^A + D^B \qquad\qquad I = A,B \tag{7.28}$$

We assume that the countries coordinate their decisions, and take fully account of the effects of their policies on foreign welfare. The Hamiltonian of this optimization problem reads

$$\begin{aligned} H^c = H_l\Big[&\ln\left(\frac{w^A}{K^{dA}}(g^A)\right) + (1-p)\ln(P\eta^A) + \ln(K^{dA}(\eta^A,g^A)) + \ln\left(\frac{w^B}{K^{dB}}\right) + (1-p)\ln(P\eta^B) \\ &+ \ln(K^{dB}(\eta^A,g^A))\Big]\exp^{-\rho t} + \lambda^A \pi^A(\eta^A,g^A)K_s^A + \lambda^B \pi^B(\eta^A,g^A)K_s^B \end{aligned} \tag{7.29}$$

where λ^A and λ^B are the positive costate variables. The necessary conditions for an optimum with respect to country A's policy instruments are given by

$$H_g^c = H_g^{nA} - H_l \frac{(K_s^A + K_s^B)}{\mu K^{dB}} r^A (\alpha (1-\eta^A) - g^A) \exp^{-\rho t} = 0 \tag{7.30}$$

$$H_\eta^c = H_\eta^{nA} + H_l \frac{(K_s^A + K_s^B)}{\mu K^{dB}} r^A \exp^{-\rho t} = 0 \tag{7.31}$$

$$-H_{K_s^I}^c = -H_l \frac{K^{IA} + K^{IB}}{K_s^I} \exp^{-\rho t} - \lambda^I \pi^I = \dot{\lambda}^I \qquad I = A,B \tag{7.32}$$

These first-order conditions are very closely related to the ones in the Nash optimization problem, equation (7.23) to (7.25). Before we compare the two sets of first-order conditions, we solve the system. The combination of equation (7.30) and (7.31) and thereby eliminating the costate variable gives a similar relation between the rate of redistribution and the rate of investment as in the Nash problem.

$$\eta^A = \frac{1-p}{p} \frac{g^A - \alpha}{\alpha} \tag{7.33}$$

This relation suggest that, given the budget, the governments' decision to spend money on investment or redistribution does not change whether government policies are coordinated or not. The rate of government investment can be determined by solving the other first-order condition in a similar way as is done in section 7.3. The appendix describes this procedure. Given that countries are identical it follows that

$$G(g^A) = (g^A - \alpha)(g^A)^{\frac{\alpha}{1-\alpha}} = \rho \alpha p \left((1-\alpha)(pH_l)^\alpha\right)^{\frac{1}{\alpha-1}} > 0 \tag{7.34}$$

This implicit solution for the rate of investment differs only from the one in the Nash solution by the parameter β. It is essential to know whether this term is larger than one, because if

$$\beta \equiv \mu (2\rho + \mu - \nu)^{-1} \lessgtr 1 \quad \Rightarrow \quad \begin{matrix} g_p \gtrless g_n \\ \eta_p \lessgtr \eta_n \end{matrix} \tag{7.35}$$

The subscripts refer to the cases that policies are not (n), and fully (p) coordinated. The term $2\rho + \mu - \nu$ represents the trade-off between the two externalities in the model.

First, there is the familiar externality that countries want to attract capital and do not take account of the effects on the foreign tax base, that is to say capital income that is earned in the foreign country. In addition, foreign labour income is in the same way affected as the foreign tax base given the specification of the production function. The combination of these two external effect together, we label as the tax-base externality. This externality is represented in equation (7.30) and (7.31) by the last terms on the right-hand side of the first equality sign. These terms have a positive sign. Countries set low tax rates and thereby low rates of investment and redistribution in order to attract capital. Because low tax rates on capital income increase the return on capital for capital owners, that country becomes more attractive for capital owners - ignoring economic growth.[8]

Second, there is an externality on economic growth in the other country.[9] We label this as the growth externality. Economic growth in one country has positive spillovers to growth in the foreign country, because capital owners invest more abroad. A larger growth of savings in one country has a positive effect on the stock of investment in the other country which stimulates economic growth. In the Nash equilibrium government expenditures are too large for the purpose to maximise growth. High rates of investment and redistribution, thus, have a negative effect on foreign economic growth, and welfare at the margin. This externality is represented in equation (7.30) and (7.31) by the difference in the value of the costate variable in the coordinated and noncoordinated case. This difference is hidden in H_g^A and H_η^A; see also equation (7.23) and (7.24).[10]

Combining these two externalities, fiscal policy has two opposing effects on foreign welfare in the Nash equilibrium. The coefficient ν represents the incentive to invest abroad, except for differences in the net return on capital. A low value of this coefficient implies that capital owners have less incentives to invest abroad, so the lower are the spillovers of too much government expenditures on growth abroad. Then, the tax-base externality dominates. This suggest that there is underprovision of investment and redistribution in the Nash case. This conclusion is also valid if the discount factor is relatively high. Then, the negative effects of fiscal policy on growth have less weight on welfare because the future is less important. Also in that case the tax-base externality

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[8]This appears also from equation (7.30) and (7.31). Because the derivatives of both first-order conditions with respect to both policy instruments are negative, the values of both instruments have to be larger if countries take account of the tax-base externality.

[9]In the long term, this externality only appears in an endogenous-growth model. Lejour & Verbon (1995c) use a neoclassical-growth model. Then, this externality does not exist in the steady-state.

[10]In the coordinated case the value of the costate variable is larger because a country takes also account off the effects on the share of the capital stock possessed by foreign capitalists, and therefore implicitly also the effects on foreign labour income. The value of the costate variable implies that $H_g^{nA} < 0$.

dominates. However, if the rate of time preference is relatively low or there is much foreign investment, such that $2\rho - \nu < 0$, the growth externality dominates. This implies that there is overprovision of investment and redistribution in the noncoordinated case.[11] Appendix 7 describes the precise relation between β and the two external effects.

The inefficient government policies also affect economic growth. We know from section 7.3 that government investment has a negative effect on economic growth at the margin. So, more expenditures on investment and redistribution affect economic growth negatively. This implies that if the tax-base externality dominates, economic growth in the coordinated case is lower than in the noncoordinated case. This result is reversed if the growth externality dominates.

The trade-off between the tax-base and growth externality is related to the trade-off in Devereux & Mansoorian (1993), who analyse government investment and public good policies in a two-country endogenous growth model with trade. Also in their model there is a negative externality on economic growth abroad due to too much government expenditures. However, there is also an offsetting externality. This trade off is also affected by the size of the economic spillovers that is to say the size of the trade in their model, as is here the size of foreign investment.

7.5 Partial Coordinated Government Behaviour

Instead of coordinating redistributive and investment policies, governments could also choose to coordinate policies in only one policy area. This section examines the effects of coordinating redistributive policies, while investment policies are still determined in a noncoordinated way. We question if this affects government policies and economic growth. In most of the fiscal federalism literature there is only one policy instrument that causes externalities. Then, coordination is welfare improving. It is not clear whether this is also the case if there are more instruments that cause externalities, in particular if there are externalities that work in opposite directions. It is possible that the external welfare effects will not diminish. Then, only coordination of all policy instruments is efficient, and not partial coordination. This could have important policy conclusions.

Countries that coordinate only one of the two policy instruments maximize different goal functions with respect to these instruments. Governments maximize the welfare

[11] Clarida & Findlay (1994) also conclude that there can be inefficiently much investment by the government caused by policy competition. However, in their static model, government investment has a direct effect on production, while here economic growth is affected.

function in section 7.3 with respect to investment, and the combined welfare function in section 7.4 with respect to redistribution. So, the government in country A maximizes

$$\max_{g^A} \; D^A, \qquad \max_{\eta^A} \; D^A + D^B \tag{7.36}$$

given the relevant restrictions that are given in sections 7.3 and 7.4. With this information we can formulate the same Hamiltonian as in section 7.3 with respect to investment, and the Hamiltonian in section 7.4 with respect to redistribution. Differentiation of both Hamiltonians with respect to the relevant policy variables and capital gives now for both cases a set of two first-order conditions in which the relevant instrument and the derivative of the costate variable are determined. The costate variable is eliminated using the method described in the appendix. As a result,

$$H^{nA}_{g^A} = 0 \;\; \& \;\; -H^{nA}_{K_s^A} = \dot{\lambda}^A \;\; \Rightarrow \;\; \alpha\rho + \beta^{-1} r^A(\alpha(1-\eta^A) - g^A) = 0 \tag{7.37}$$

$$H^{c}_{\eta^A} = 0 \;\; \& \;\; -H^{c}_{K_s^A} = \dot{\lambda}^A \;\; \Rightarrow \;\; -\rho(1-p) + r^A\eta^A = 0 \tag{7.38}$$

Combining these two first-order conditions it follows that

$$G(g^A) \equiv (g^A - \alpha)(g^A)^{\frac{\alpha}{1-\alpha}} = \rho\,\alpha\left((1-\alpha)(pH_l)^{\alpha}\right)^{\frac{1}{\alpha-1}}(p-1+\beta) > 0 \tag{7.39}$$

$$\eta^A = \frac{1-p}{p-1+\beta}\,\frac{g^A-\alpha}{\alpha} > 0 \qquad \text{if} \quad p+\beta-1 > 0 \tag{7.40}$$

The expressions for the rate of government investment and redistribution in equation (7.39) and (7.40) are closely related to the ones derived in the noncoordinated and fully coordinated case, see equation (7.26), (7.27), (7.33) and (7.34). In ranking their magnitudes, the dominance of the tax-base externality or the growth externality is crucial, which can be seen from the magnitude of β. Comparing all results, it follows that

$$\beta \gtrless 1 \;\; \Rightarrow \;\; \begin{matrix} g_p \overset{>}{<} g_n \overset{>}{<} g_{pc} \\ \eta_{pc} \overset{>}{<} \eta_p \overset{>}{<} \eta_n \end{matrix} \tag{7.41}$$

The subscripts refer to the cases that policies are not (n), partial (pc) and fully (p) coordinated.

Starting from the Nash equilibrium, coordination of redistributive policies leads to "too much" policy adjustment. Given that the tax-base externality dominates ($\beta < 1$), coordination of redistributive policies increase the rate of redistribution as is the aim, but the increase in the rate of redistribution exceeds the Pareto-efficient level. By an increase in the rate of redistribution government investment is reduced, because otherwise the distortionary effect of the taxes will become too large.[12] This reduction in the rate of investment is motivated by the noncoordinated behaviour of the government in this policy area. As a result, the rate of investment will be lower than it will be in the noncoordinated equilibrium, and deviates more from efficient solution. Due to the lower rate of investment, there is an extra upward effect on the rate of redistribution. As a result, this rate will exceed the Pareto-efficient rate.[13]

In the case that the spillover effect of economic growth dominates ($\beta > 1$), countries lower the rate of redistribution that was inefficiently high. Because investment polices are not coordinated, governments increase their rate of investment. This increases the distortionary effect of the tax rate. As a consequence, the rate of redistribution is reduced further below the efficient level in the fully coordinated case. Also here, the change in redistributive policy is "too large".

Although the effects of partial coordination on the rate of redistribution and investment are quite substantial, the effects on the tax rate and economic growth are relatively modest. This is due to the fact that the changes in the rate of redistribution and investment work in opposite directions. Comparing the levels of the tax rates and economic growth, see equation (7.2) and (7.11), it follows that

$$\beta \begin{matrix} < \\ > \end{matrix} 1 \quad \Rightarrow \quad \begin{matrix} \tau_p \begin{matrix} > \\ < \end{matrix} \tau_{pc} \begin{matrix} > \\ < \end{matrix} \tau_n \\ \pi_n \begin{matrix} > \\ < \end{matrix} \pi_{pc} \begin{matrix} > \\ < \end{matrix} \pi_p \end{matrix} \tag{7.42}$$

We will discuss the results in equation (7.42) for the case in which the tax-base externality dominates ($\beta < 1$). Starting from the Nash case, partial coordination increases the rate of redistribution substantially. Therefore, the tax rate increases, in spite of a downward effect induced by less government investment. Because the rate of investment is substantially higher in the fully coordinated case, the level of the tax rate is lower than it is in the fully coordinated case. The increase in the tax rate due to partial coordination has a negative effect on economic growth. This effect is reinforced

[12]This follows from differentiating equation (7.37) with respect to the rate of investment and redistribution.

[13]Lejour & Verbon (1995c) derive a similar result using a neoclassical-growth model.

in the fully coordinated case by the high rate of investment that affects economic growth negatively at the margin. If the growth externality dominates, a reverse reasoning holds.

7.6 A Reduction of Capital Barriers

This section studies the consequences of further integration of capital markets in the economic union by a reduction of the costs of investing abroad. This reduction in costs can be the consequence of decisions by the EU Commission. They can decide to harmonise company laws in order to make financial comparisons more easily and thereby decreasing the possibilities to exploit asymmetric information. This will lead to increased investment flows between the countries. The reduction in costs is represented by a decrease in the marginal mobility costs, μ. The reduction in costs is assumed to be given. We analyse the effects on the rate of investment and redistribution if government policies are determined in a noncoordinated and partially coordinated way. We compare these results with the case that the policies are fully coordinated.

In general, the effects of lower mobility costs are analysed by differentiating the first-order conditions for country A and B with respect to the endogenous variables and the mobility costs. After some substitutions the effects of a change in mobility costs on the policy instruments are derived. However, if countries are assumed to be identical, the analysis is simplified considerably. Then, the derivatives of a policy instrument are identical for country A and B. In the derivation of the values of the policy instruments we already used the assumption of identical countries. The effects of lower mobility costs can be derived by differentiating the values of the rate of investment and redistribution in the Nash equilibrium, see equation (7.26), and (7.27), with respect to the mobility costs. As a result,

$$\frac{\partial G(g_n)}{\partial g_n}\frac{\partial g_n}{\partial \mu} = \frac{G(g_n)}{\mu}(1-\beta) \gtrless 0 \quad \text{if} \quad \beta \lessgtr 1 \qquad \frac{\partial G(\,)}{\partial g} > 0 \tag{7.43}$$

$$\frac{\partial \eta_n}{\partial \mu} = \frac{1-p}{\alpha p}\frac{\partial g_n}{\partial \mu} \gtrless 0 \quad \text{if} \quad \beta \lessgtr 1 \tag{7.44}$$

The rate of investment is affected by two opposing sources. On the one hand, there is an upward effect on the rate of investment, because there is relatively more foreign capital within the country. Foreign capital grows with rate π^B, and is not affected by changes in country A's fiscal policy. Country A's government, thus, influences the

growth of a smaller share of the capital stock in its own country.[14] Because government investment affect economic growth negatively at the margin, the government has an incentive to invest more. On the other hand, due to the increase in capital mobility, capital is more sensitive to differences in the rate of return of capital. Therefore countries lower the rate of investment to increase the net return on capital and thereby attracting more capital and increasing labour income. The latter effect dominates if capital owners do not have many other incentives to invest abroad, and if the rate of time preference is high ($\beta < 1$). This implies that the rate of investment is reduced. The rate of redistribution is also reduced, because it is positively correlated to the rate of investment.

We compare these results with the case in which government policies are fully coordinated. Then, governments are also interested in the growth of the capital stock invested abroad. For that reason they have no incentive to increase the rate of investment. In addition, they do not compete with the other country to attract capital by lowering the tax rates because of the tax-base externality. As a result, a change in mobility costs has no effect on either the rate of investment or the rate of redistribution. Government policies are, thus, not affected by the integration of capital markets if countries coordinate their policies.

Section 7.4 concluded that both government instruments are inefficiently used, if countries do not coordinate policies. We are interested in the effect of integrating capital markets on the inefficient use of noncoordinated government instruments. Because in most of the literature tax competition is analysed by comparing the efficient level of a government instrument with the one that results from noncoordinated government behaviour, we use the difference between the values of the government instruments in the cases that policies are coordinated and not coordinated as a proxy of the degree of tax competition, see also chapter 6.

As shown above the tax rate in the coordinated case does not change. This simplifies the analysis of lower mobility costs on the inefficient use of government policies considerably. If there is overprovision of government investment and redistribution ($\beta > 1$), countries raise their expenditures on investment and redistribution if capital market integration proceeds. This suggests that the inefficient use of these government instruments is increased. If there is underprovision of government expenditures this result also holds. In that case, these expenditures are further reduced if capital market integration proceeds, such that the values of these instruments deviates more from the Pareto-efficient solution. This exert an upward effect on the rate of economic growth.

[14]This can also be seen from the value of the costate variable in the appendix. The ratio K^{AA}/K^{dA} diminishes, so growth is less important in the maximisation problem,

This increase in the rate of economic growth enlarges the difference with the rate of economic growth that results if countries coordinate their policies.

If only redistributive policies are coordinated, a reduction in the mobility costs has a similar effect on the rate of investment if policies are not coordinated. In case government investment is already inefficiently low, the rate of investment is further reduced. In case these investments are already inefficiently high, the opposite results holds. Due to capital market integration, this policy instrument is more inefficiently used, if is compared to the case in which both policies are coordinated. As can be seen from equation (7.38) the change in the rate of redistribution is negatively related to the change in the rate of government investment. Thus, if investment is reduced, expenditures on redistribution are increased. However, in that case ($\beta < 1$), redistributive transfers are overprovided. So, the level of transfers deviates more from the Pareto-efficient solution. For the case that $\beta > 1$ a similar results holds. Then, there is underprovision of redistributive transfers. With respect to both policy areas the government uses these instruments more inefficiently if capital market integration proceeds. This increases the desirability of policy coordination. Because the rate of investment and redistributive transfers change in opposite directions the effect of lower mobility costs on the tax rate and economic growth are not clear in the partially coordinated case.

7.7 Conclusions

This chapter combines the standard literature on tax competition - that deals mostly with static models in which capital is mobile between the regions - and the literature on endogenous growth and redistribution. We develop a two-country model with imperfectly integrated capital markets in which capital in each country is taxed at the source. Tax contributions in each country are used for redistributive transfers to workers and investment to stimulate production. In each country there are two groups; workers and capital owners who have the possibility to invest their money at home and abroad.

The government in each country represents the interests of workers. In the Nash equilibrium, governments invest more than the amount necessary to maximise economic growth, and the government redistributes money to the workers. These results show up because workers do not have to pay for these government expenditures. Knowing that the reaction curves have a positive slope and do intersect at most once, there is at most one Nash equilibrium.

This Nash equilibrium is compared with the one that results if both countries take account of the welfare effects on the other country. Then, the governments take account

of two externalities. First, fiscal policy affects the tax base by the change in the capital stock abroad. Second, fiscal policy affects economic growth abroad by the growth of the capital stock that is invested in the foreign country. Because both externalities work in opposite directions it is not clear whether redistributive transfers and investment are over- or underprovided. This chapter shows that if the rate of time preference is low (so workers consider the future as important) and there is relatively much foreign investment, the second externality dominates. Then, there is overprovision of government spending in both policy areas, and economic growth is inefficiently low. Otherwise, the former externality dominates, and there is underprovision and inefficiently high economic growth.

The external effects are not solved by partial coordination that is to say only coordination of redistributive policies. This coordination agreement tends to change the rate of redistribution in the direction of the Pareto efficient level. Because the rate of government investment changes in the opposite direction, the change in the rate of redistribution exceeds even the Pareto-efficient level. The rate of investment is also more distant from the Pareto-efficient solution than it is in the Nash equilibrium. The tax rate does change in the direction of the Pareto-efficient level. We have a similar result for the rate of economic growth.

The effects of increasing integration of the capital markets on fiscal policy are closely connected to the inefficient provision of transfers and investment. If the externality on foreign labour income dominates, countries have an incentive to lower government spending in both areas, while government spending is raised if the externality on foreign economic growth dominates. Because fiscal policy does not change due to economic integration if these policies are coordinated this implies that the inefficient use of investment and redistributive policy will increase irrespective of the fact whether there is over- or underprovision. If only redistributive policies are coordinated the inefficient use of both policy instruments does also increase.

The results of this chapter stress the importance of the role of economic growth in evaluating tax competition and the provision of public goods. The model has some limitations in the sense that it is only possible to analyse this issue with identical countries and identical growth rates to guarantee balanced growth, and therefore not suitable to study structural differences between countries. It is, however, an useful instrument to study the consequences of policy competition in the long term if countries do not differ too much.

Appendix 7

The system of three first-order conditions, equation (7.23) to (7.25), is solved in the following way. Firstly, we differentiate equation (7.23) with respect to time. Rearranging the resulting expression using equation (7.23) gives

$$K_s^A \lambda^A \left(\rho + \frac{\dot{\lambda}^A}{\lambda^A} + \pi^A \right) + \frac{H_l}{\mu} \exp^{-\rho t} (K_s^A K^{BA} - K_s^B K^{AA})(\pi^A - \pi^B) = 0 \qquad \text{(A7.1)}$$

Substituting equation (7.25) in the expression above to eliminate $\dot{\lambda}^A$, it follows that

$$\lambda^A = \frac{H_l \exp^{-\rho t}}{\rho K_s^A K^{dA}} \left(K^{AA} - \left(\frac{K_s^A K^{BA} - K_s^B K^{AA}}{\mu K^{dA}} \right) (\pi^A - \pi^B) \right) \qquad \text{(A7.2)}$$

Substituting this expression in equation (7.23) the costate variable is eliminated. So,

$$\alpha \mu \rho K^{dA} + r^A (\alpha(1-\eta^A) - g^A) \left(\rho (K_s^A + K_s^B) + \mu K^{AA} - \frac{K_s^A K^{BA} - K_s^B K^{AA}}{K^{dA}} (\pi^A - \pi^B) \right) = 0 \qquad \text{(A7.3)}$$

If it is assumed that countries are identical, equation (7.27) follows immediately. Given that the countries are identical, equation (A7.3) can also be used to determine the sign of the expression on the first row of equation (7.29).

The system of the three first-order conditions in section 7.4, equation (7.30) to (7.32), is solved in a similar way. Equation (7.30) is differentiated with respect to time and simplified using equation (7.30). This equation is substituted in equation (7.32) to eliminate $\dot{\lambda}^A$. The modified equation (7.32) is substituted in (7.30) to eliminate the costate variable. Then, we get the result in equation (7.34). The value of the costate variable is

$$\lambda^A = \frac{H_l \exp^{-\rho t}}{\rho K_s^A} \left(1 + \frac{\dot{K}_s^A + \dot{K}_s^B}{\mu} \left(\frac{1}{K^{dA}} - \frac{1}{K^{dB}} \right) - \frac{K_s^A + K_s^B}{\mu} \left(\frac{\pi^A K^{AA} + \pi^B K^{BA}}{(K^{dA})^2} - \frac{\pi^B K^{BB} + \pi^A K^{AB}}{(K^{dB})^2} \right) \right) \qquad \text{(A7.4)}$$

Notice that the value of the costate variable in the coordinated case exceeds the one in the noncoordinated case by the term K^{dA}/K^{AA} if the countries are identical.

Using the values of the costate variables, the relation between the tax-base and growth externality and the term $\beta \equiv \mu/(2\rho + \mu - \nu)$ is quite simple. First, substitute the value of the costate variable in the noncoordinated case in the first-order condition with respect to investment in the coordinated case, equation (7.30). Evaluate this equation for the values of the endogenous variables in the noncoordinated

case. As a result, equation (7.30) consists of the following term that represents the combination of the growth and the tax-base externality. It equals

$$\left(\frac{K^{AB}}{\rho K^{dA}} - \frac{2}{\mu}\right) H_l r^A(\alpha(1-\eta^A) - g^A)\exp^{-\rho t} \tag{A7.5}$$

With the help of the capital mobility equation, equation (7.4) it is easy to show that $K^{AB}/K^{dA} = \nu/\mu$. Thus, the sign of equation (A7.5) depends on the sign of $\nu - 2\rho$. This is similar to the condition that β is larger or smaller than one. Note, that we could have derived the same result by using equation (7.31).

This appendix also analyses the slopes of the reaction curves in the Nash equilibrium. These slopes can be expressed by the changes in the rate of investment of both countries. The analysis is simplified, because the relation between the rate of redistribution and government investment as in equation (7.26) still holds. This relation implies that changes in both policy variables of one country work in the same direction. We differentiate equation (7.23) with respect to both investment variables taking into account the changes in the rate of redistribution. In this procedure we assume that both countries are identical. It follows that

$$\left(\alpha\rho\mu(K_s^A + K_s^B) + r^A(\alpha(1-\eta^A) - g^A)\left(\mu K_s^A - \frac{K_s^A K^{BA} - K_s^B K^{AA}}{K^{dA}}\right)\right) \times$$
$$\left(\frac{d(1-\tau^A)r^A}{dg^A}dg^A - \frac{d(1-\tau^B)r^B}{dg^B}dg^B\right) + \left(\rho(K_s^A + K_s^B) + \mu K^{AA}\right) r^A \frac{(\alpha^2(1-\eta^A) - g^A)}{(1-\alpha)g^A}dg^A = 0 \tag{A7.6}$$

Using equation (A7.3), it is easy to show that the first expression on the first row has a positive sign. In addition, the derivatives of the net return on capital with respect to the rate of investment, taking into account the changes in the rate of redistribution, are negative. As a result, the term preceding the change in the rate of foreign government investment is positive. Because the term preceding the change in the rate of government investment at home is negative on the second row, the total expression preceding that variable is negative. The relation between changes in the rate of government investment at home and abroad is, thus, positive. The reaction curves have a positive slope. Moreover, the expression preceding dg^A is larger than the one preceding dg^B. This implies that the slope of country A's reaction curve is larger than one. Similarly, the slope of country B's reaction curve is smaller than one.

Chapter 8

Summary and Concluding Remarks

8.1 Introduction

This book examined several features of economic integration on national social insurance policies in an economic union. Economic integration was represented by the mobility of the production factors, labour (chapter 3) and capital (chapters 4 and 7), and the mobility of consumer goods (chapters 5 and 6). The interdependency between the member states caused by the integration of labour, capital and consumer goods markets transmitted the effects of national social insurance policies to the other countries.

The general method, followed in all chapters, was to identify the external effects of national social insurance policies on other countries, and to determine whether this leads to inefficient high or low provision of social insurance. The latter results are derived by comparing the situation in which both countries are only interested in maximising the welfare in their own country to the situation in which countries take account of the welfare effects in other countries. In addition, we discussed the consequences of attempts to integrate the labour, capital and consumer goods markets even further on national social insurance policies. This chapter summarizes these results by combining the results of all chapters per issue. Section 8.2 discusses the results with respect to tax competition and the inefficient provision of social insurance. Section 8.3 presents the results of increasing economic integration.

8.2 The Externalities and the Inefficient Provision of Social Insurance

Chapter 3 (dealing with labour mobility) concludes that social insurance policies affect the migration flows, and thereby the tax base and labour market in the other country. We distinguish mobility of workers who have a low and those who have a high probability of being not employed. Social insurance policies are affected by the interests of low-risk and high-risk workers. If high-risk people are mobile, we obtain the familiar result that countries provide inefficiently low social insurance benefits in order to scare off high-risk workers in their country. This ratio affects foreign welfare negatively because it reduces the tax base and cause congestion effects on the labour market abroad. If low-risk workers are mobile, chapter 3 shows that the result can be reversed - depending on the preferences and relative political influence of low- and high-risks. Countries have the incentive to set inefficiently high tax rates in order to reduce the number of low-risk people. This is caused by the dominance of the negative congestion costs on the labour market over the positive effects on the tax base. Then, foreign

foreign welfare is also negatively affected by the increase in the congestion costs on their labour market. Due to labour mobility, there is, thus, overprovision of social insurance benefits. This result shows that even if only labour mobility would affect social insurance policies in integrated markets, this does not necessarily lead to inefficiently low social benefits.

The social insurance system also affects international capital flows if labour unions are able to shift the worker-based social insurance contributions on to employers in the wage-bargaining process as shown in chapter 4. By this mechanism the return on capital, and consequently the size of the capital stock within that country are negatively affected by social insurance taxes. If policymakers represent the weighted interests of workers and residing capital owners, they have an incentive to set low tax rates in order to attract capital. This reduces, however, labour income abroad, and thereby also the tax base, and increases the return on capital abroad. The first externality has a negative influence on the utility of workers, while the latter externality affects the utility of capital owners positively. Chapter 4 shows that the first externality dominates. As a result, countries set inefficiently low tax and benefit rates.

Chapters 5 and 6 show that trade also transmit the effects of national social insurance policies to other countries. These policies are affected by the interests of workers and producers. Social insurance contributions are a labour cost factor that exert an upward pressure on producer prices in imperfectly competitive markets. By increasing the tax rate prices will rise. This increase in costs is also paid by foreign consumers who buy these goods (terms-of-trade externality). On the other hand, high prices affect competitiveness negatively. As a consequence, production, profits (or the number of firms), and employment are also affected negatively (comparative advantage externality). The net effect of these externalities is not always clear. Chapter 5 concludes that the terms-of-trade externality dominates in the short run, if the number of firms is fixed, and wages are fully indexed to the price level. Then, countries have the incentive to provide inefficiently much social insurance, partly paid by foreign consumers. If there is free entry and exit, however, the terms-of-trade externality will be reduced, and if the degree of substitution between home- and foreign-produced goods is sufficiently large, the comparative-advantage externality dominates. Then, countries will provide an inefficiently low amount of social insurance.

Although there is overprovision of social insurance if the number of firms is fixed in chapter 5, this result does not necessarily hold in chapter 6. In that model wages are not indexed to the price level, but nominally fixed. Compared with indexed wages, this reduces the upward pressure of higher taxes on the price level. This reduces the terms-of-trade externality. Although the number of firms is fixed, it is not clear whether there

is overprovision of social insurance. This ambiguity in the results is also influenced by the level of the lump-sum tariffs. The level of the tariff rate is negatively related to the probability that social insurance is underprovided.

Chapter 7 extends the analysis of the static models thus far with respect to time. As in chapter 4, capital is mobile. We use an endogenous growth model in which government investment stimulates production. The government, that represents the interests of the workers, decides on social insurance and investment policies. Expenditures in both policy areas are paid by a tax on capital income. Because workers do not finance government investment, the government will spend too much on investment such that it affects economic growth negatively. From the static model we know that national social insurance policy affects the tax base abroad. That is also the case in the dynamic model. Contrary to the static model, the return on capital abroad is not affected, because of endogenous growth. In addition, there is an externality on foreign growth. Because expenditures on social insurance and investment affect growth negatively at the margin, the growth of the capital stock invested abroad and thereby the growth of the total capital stock and labour income abroad is also negatively affected. The externality on foreign economic growth works in the opposite direction of the one on the foreign tax base. The externality on growth dominates if the rate of time preference is low and the share of foreign investment relatively large. Then, there is overprovision of social insurance and the rate of economic growth is inefficiently low. If the externality on the tax base dominates the results are the opposite. Coordination of redistributive policies seems to diminish the external welfare effects if we use the tax rates as an indication for inefficiency of decentralized policies.

This overview of the results on tax competition shows that it is far from clear whether economic integration implies an underprovision of social insurance if countries do not coordinate their policies. This conclusion follows if labour mobility is relevant, and mainly low-risk people (the higher educated) migrate. However, also if the low degree of labour mobility (see section 1.2) implies that marginal mobility has nearly no effect on social insurance policy, the results do not suggest that underprovision will prevail. Even if we ignore the dynamic model for the moment, the results in the static models are ambiguous. Although the external effects transmitted by capital flows lead undoubtedly to an underprovision of social insurance, that is not the case for trade. In particular, if there is real wage rigidity and not much flexibility on product markets, the external effects transmitted by trade lead to overprovision. This depends on the terms-of-trade externality. Although in reality prices of consumer goods are also influenced by world prices, and thereby probably reduce the terms-of-trade effect, perfect competition does not prevail on product markets, and labour markets are characterised by real wage

rigidity. This does not suggest that there will be overprovision because it is not clear whether capital mobility or trade affects social insurance policies more heavily. It does show, however, that underprovision does not necessarily prevail.

This conclusion is enforced by the growth externality in the dynamic model. In particular, if we take relatively much account of the future, the results suggest that social insurance is overprovided because its social insurance policy affects economic growth abroad negatively.

8.3 Increasing Integration

The conclusions on the issue of increasing integration, represented by lower migration costs, mobility costs, and trade barriers are mixed. This is not surprising because chapter 3 and 4 present models in which there is one-sided flow of the production factor between non-identical countries, chapters 5 and 6 deal with static models in which countries are identical, and chapter 7 focuses on economic growth with identical countries. However, after summarizing the main results we are able to draw some overall conclusions.

From chapters 3 and 4 we conclude that an increasing inflow of a production factor, whether it consists of low-risk workers or physical capital, exerts a downward pressure on the level of social insurance, while an increasing outflow exerts an upward pressure (assuming that the degree for risk aversion is larger than one). The demand for insurance is reduced in the country that faces the increase in population or capital (migration or capital-importing country), because an increase in low-risks raises the benefit, and the increase in capital raises the wage rate. This lowers the marginal utility of benefit income. This effect exerts a downward effect on the level of social insurance. An inflow of high-risk workers would raise the marginal utility of the benefit and thereby exerting an upward effect on the level of social insurance. The opposite result holds for the country that faces the outflow of people or capital (home or capital-exporting country).

The integration of the labour markets and capital markets has also asymmetric effects on the desirability of coordination for both countries. The asymmetric results as such are caused by the one-sided flow of the production factor. If workers migrate, the migration country faces more harmful effects from noncoordinated social insurance policies, while the home country faces less harmful effects. If capital is mobile, the capital-importing country faces less harmful effects and the capital-exporting country more harmful effects. The results for capital and labour mobility, thus, differ with respect to this point. This difference is explained by relating the changes in the social insurance tax rates to the inefficient provision of social insurance. If low risks migrate social insurance is

overprovided in the benchmark case. Then, the downward pressure on the social insurance tax rate in the migration country due to increasing mobility lowers the externality that the home country faces. If capital is mobile social insurance is under-provided. Thus, the capital-exporting country faces now more harmful effects if the capital-importing country lowers the tax rate due to increasing mobility.

We can draw two overall conclusions based on chapters 3 and 4. If economic integration goes on, countries that experience inflow of capital and migrants faces other effects than countries that experience an outflow. This could imply that the social insurance levels diverge if initially, the country that faces the inflow of capital and migrants spends already less money on social insurance. In addition, the change in welfare gains from policy coordination depends on the inefficiently low or high provision of social insurance, and the change in policy of the other country induced by economic integration. Because the welfare gains for one country are reduced, coordination will become less likely.

Chapters 5 and 6 show that the effects of lower trade barriers on social insurance policies depend on the possibility of entry and exit of firms, and the characteristics of the trade barriers. Chapter 5 shows that lower trade barriers stimulate trade, production, employment, and real wages. Due to the increase in employment, workers demand less insurance. However, real profits are also raised in the short run. Thus, the opposition from producers against social insurance contributions is reduced. For that reason the overall effect on the social insurance level is ambiguous. If there is free entry and exit, profits will diminish and lower trade barriers exert a downward pressure on social insurance. The level of social insurance is reduced whether social insurance policies are coordinated or not.

Contrary to chapter 5, chapter 6 presents a model that analyses also the effects of lower trade barriers on the externality of noncoordinated social insurance policies. The model shows that the welfare gains from agreements on tariff policies can be reduced or even destroyed by the effects on redistributive policy. Redistributive policy will be used as a substitute for tariff policy to stimulate production and employment in the own country. Due the lump-sum character of the trade barriers in that model (instead of proportional to the price of imported goods), it is not always clear whether further integration of consumer goods markets induced by lower exogenous or endogenous trade barriers exerts a downward pressure on the redistributive tax rate. This can be caused by much competition on the home market. Then, prices of consumer goods produced at home are low and the tariffs are relatively high, such that lower tariffs do not induce much competition from abroad. So, there is less reason to lower the redistributive tax

rate. The model does show that the negative welfare externality of noncoordinated redistributive policies is reduced due to the integration of consumer goods markets if redistributive transfers are initially overprovided. However, if these transfers are underprovided, tax competition will increase due to economic integration. Then, the welfare gains of coordinating redistributive policies will also increase.

This last result contributes to the second conclusion drawn above, that the change in welfare benefits of policy coordination induced by economic integration depends on the inefficiently low or high provision of insurance. The results of the static models can be combined if we make the following assumptions. First, we conjecture that labour mobility does not affect social insurance policy. Second, we assume that the opposing effects of capital market integration on capital-importing and exporting countries cancel each other out. Then, the results of increasing integration are purely determined by lower trade barriers. In particular, if the trade barriers are proportional to the producer prices, the combination of the results in the static models suggests that increasing economic integration will exert a downward pressure on the level of the social insurance benefits and tax rates. Moreover, if social insurance is overprovided, economic integration will reduce the necessity of policy coordination. However, if it is underprovided, coordination will become more desirable.

The dynamic model in chapter 7 does not confirm these conclusions. If governments spend an inefficiently large amount of money on investment and redistribution, economic integration represented by increasing capital mobility exert an upward pressure on government spending. This is also the case for investment, if redistributive policies are coordinated. In both cases whether there is no or partial coordination, the inefficient use of both government policies is increased, so also the welfare gains of coordination. If an inefficiently low amount of money is spent on investment and redistribution, increasing capital mobility exert a downward pressure on the budget. Also in that case, the inefficient use of the policy instruments is increased. In this sense partial coordination is not the solution for solving the external welfare effects. Due to the spillovers between both policy areas, economic integration still enlarge the external welfare effects.

Comparing these results with those of the static models, it follows that if the government spends an inefficiently small amount of money on social insurance further economic integration will increase tax competition and it will exert a downward pressure on the social insurance budget compared to capital income. From the perspective of maximising welfare in the economic union and protecting the level of social insurance for some equity reasons, these results imply the members states have to coordinate their

social insurance policies. From the perspective of maximising welfare it seems also prudent to coordinate policies if social insurance is overprovided, because the results in chapter 7 suggest that tax competition will increase.

In particular, if these results will also carry over to the analysis of increasing trade, and long-term economic growth, these effects could dominate the result in chapter 6 that tax competition will diminish in that case. Besides, also in that chapter there is the risk that ongoing integration will lead in the end to an underprovision of social insurance and increasing tax competition.

8.4 Overall Conclusions

The overall conclusions are as follows. First, social insurance is not necessarily underprovided, in particular if long-term growth is taken into account. Second, increasing economic integration will probably lead to increasing tax competition with respect to social insurance policy. This conclusion implies that in the long term coordination of these policies is desirable even if this does not protect necessarily the level of social insurance. Third, the results suggest that increasing integration exert a downward pressure on the social insurance budget. However, this conclusion does not hold if there is overprovision caused by the growth externality in the dynamic model. Fourth, the effects of increasing integration are not similar for all member states in the union, but critically depend on the balance of immigration and emigration, and the balance of import and export of capital and consumer goods. Fifth, the welfare gains of cooperation in one policy area can be substantially reduced by more competition in other policy areas.

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Samenvatting (in dutch)

Met het proces van economische integratie - wereldwijd en met name in Europa (Europese Unie) - wordt de wederzijdse economische afhankelijkheid tussen landen steeds groter. Dit heeft zijn weerslag op het fiscaal and sociaal beleid van de lidstaten. Vanwege de integratie van arbeids-, kapitaal- en goederenmarkten worden de belastingbases, te weten arbeids- en kapitaalinkomen en de waarde van de consumptie steeds mobieler en daarmede gevoeliger voor kleine verschillen in fiscaal beleid tussen de verschillende lidstaten. Om die reden zijn de BTW tarieven in de Europese Unie tot op zekere hoogte geharmoniseerd en heeft men ook de mogelijke harmonisatie van de vennootschapsbelasting in Europees verband onderzocht. Onderbelicht zijn echter de effecten van arbeids- en kapitaalmobiliteit en handel op de stelsels van sociale zekerheid in de lidstaten.

Dit proefschrift bestudeert de effecten van economische integratie - gerepresenteerd door de grensoverschrijdende mobiliteit van arbeid, kapitaal en goederen - op het sociaal zekerheidsbeleid van de verschillende lidstaten. Vanuit een theoretisch-economische invalshoek analyseren wij in hoeverre lidstaten de mogelijkheid hebben hun sociaal zekerheidsbeleid zodanig strategisch te bepalen dat zij daarmede economische voordelen behalen ten opzichte van de andere landen in de economische unie. Uitgaande van de veronderstelling dat landen hun eigenbelang nastreven, analyseren wij de effecten van nationaal sociaal zekerheidsbeleid op de andere lidstaten. Dit zijn de zogenaamde externe effecten van besluitvorming. Wij analyseren of deze externe effecten bestaan met betrekking tot sociaal zekerheidsbeleid, Daarnaast vragen wij ons af op dit leidt tot een te laag of een te hoog niveau van sociale zekerheid ten opzichte van een beleid waarbij met de belangen van alle lidstaten rekening wordt gehouden en niet alleen het eigenbelang. Gegeven een bepaald niveau van economische afhankelijkheid bestuderen wij ook de effecten van verdergaande economische integratie op het nationaal sociaal zekerheidsbeleid en op de externe effecten van de besluitvorming.

Hoofdstuk 3 tot en met 7 van dit proefschrift behandelen deze vragen. In hoofdstuk 1 wordt kort de ontwikkeling van economische integratie in Europa geschetst met de daarbij behorende effecten op de mobiliteit van arbeid en kapitaal en goederen, de verschillen in sociaal zekerheidsbeleid in de verschillende lidstaten en een kort overzicht van de literatuur op het gebied van economische afhankelijkheid en de externe effecten van fiscaal beleid. Hoofdstuk 2 presenteert het basismodel dat in de meeste van de navolgende hoofdstukken als instrument voor de analyse wordt gebruikt. Daarbij wordt nader ingegaan op de veronderstellingen die aan het model ten grondslag liggen en de gebruikte methode. De daaropvolgende hoofdstukken behandelen de gevolgen van arbeidsmobiliteit (hoofdstuk 3), kapitaalmobiliteit (hoofdstuk 4 en 7) en handel (hoofdstuk 5 en 6). In deze samenvatting zal nader op deze hoofdstukken worden ingegaan waarna enkele conclusies worden getrokken die ook in hoofdstuk 8 vermeld zijn.

Hoofdstuk 3 gaat nader in op de mobiliteit van werknemers met een hoog en laag risico om geen werk te hebben (de zogenoemde 'hoge-risico' en 'lage-risico' individuen). Werknemers migreren als hun verwachte nut in het immigratieland groter is dan in het emigratieland. Sociale zekerheid beïnvloedt dit verwachte nut enerzijds via de belastingen (netto loon) anderzijds via de uitkering. Migratie beïnvloedt de belastingbasis, te weten het looninkomen, en de arbeidsmarkt. De overheid, die de belangen behartigt van de huidige lage- en hoge-risico ingezetenen, houdt rekening met de effecten van migratie bij de bepaling van het optimale sociaal zekerheidsbeleid. Dit betekent dat, als de hoge-risico werknemers mobiel zijn, de sociale uitkeringen inefficient laag zullen zijn om immigratie van hoge risico's te ontmoedigen en emigratie aan te moedigen. Dit heeft negatieve externe welvaartseffecten op het andere land waaruit minder hoge risico's vertrekken of meer binnen komen. Als landen hun sociaal zekerheidsbeleid zouden coördineren zou het niveau van sociale zekerheid hoger zijn in beide landen. Als de lage risico's mobiel zijn kan het resultaat tegenovergesteld zijn, afhankelijk van de preferenties en van de relatieve politieke invloed van beide groepen werknemers. De landen hebben dan een prikkel om de belastingtarieven inefficiënt hoog vast te prikken om een instroom van lage risico's te verhinderen. De landen hebben hier belang bij vanwege de negatieve effecten op de arbeidsmarkt ondanks de positieve effecten op de belastingbasis. Dit resultaat laat zien dat als sociaal zekerheidsbeleid alleen door arbeidsmobiliteit beïnvloed wordt, dit niet noodzakelijkerwijs tot een te laag niveau van sociale zekerheid zal leiden. Dit is met name relevant als de lage risico's geïdentificeerd worden met de hoger opgeleiden. Zij zijn namelijk veel mobieler dan lager opgeleiden.

Een toename van de mobiliteit van arbeid wordt in dit model gerepresenteerd door een daling van de migratiekosten - een verzamelnaam voor de fysieke en psychische kosten die met migratie samenhangen. Een toename van mobiliteit leidt tot een lager (hoger) niveau van sociale zekerheid in het immigratie- (emigratie-) land als de lage risico's mobiel zijn. De reden hiervoor is dat de belastingbasis en daarmede de uitkering groter (kleiner) wordt en als gevolg daarvan het niveau van de belastingen verlaagd (verhoogd) wordt. Als de hoge risico's mobiel zijn, geldt een zelfde redenering, maar zijn de resultaten precies het tegenovergestelde.

De toenemende mobiliteit heeft ook een asymmetrisch effect op de wenselijkheid van coördinatie van sociale zekerheid. Als het emigratieland de belastingen verhoogd, die al inefficiënt hoog zijn, ondervindt het immigratieland daar meer nadelige effecten van een gebrek aan coördinatie. Het immigratieland verlaagt de inefficiënt hoge belastingen. Als gevolg hiervan ondervindt het emigratieland minder nadelige effecten van belastingcompetitie en heeft ze dus minder reden om het sociaal zekerheidsbeleid te coördineren. Dit resultaat geldt ook als de hoge risico's mobiel zijn.

Hoofdstuk vier behandelt de effecten van kapitaalmobiliteit op sociale zekerheid in een statische wereld. Kapitaaleigenaren investeren in hun eigen land of in het buitenland. Investeren in het buitenland gaat echter met extra kosten gepaard. Sociale zekerheid is gefinancierd door een belasting op het arbeidsinkomen van werknemers die gedeeltelijk afgewenteld wordt op werkgevers tijdens de loononderhandelingen tussen vakbonden en werkgevers. Dit betekent dat er sprake is van herverdeling tussen kapitaaleigenaren en werknemers. Als gevolg van de afwenteling beïnvloedt het stelsel van sociale zekerheid de lonen en daarmede de werkgelegenheid en het rendement op kapitaal. De overheid representeert de belangen van kapitaaleigenaren en werknemers. Het model laat zien dat als het sociaal zekerheidsbeleid van beide landen niet gecoördineerd wordt er twee tegenovergestelde externe effecten zijn: één op de belastingbasis, te weten het arbeidsinkomen, in het buitenland en een andere op het rendement op kapitaal in het buitenland. Het blijkt dat het eerste externe effect overheerst. Het niveau is dus te laag bij gebrek aan coördinatie: werknemers hebben er belang bij dat de belastingen laag zijn, zodat het rendement op kapitaal groter wordt en daarmede kapitaal aangetrokken wordt hetgeen een positief effect op het looninkomen heeft. Dit belang overheerst dat van kapitaaleigenaren die er belang bij hebben dat de toename van buitenlands kapitaal beperkt is, omdat dat een drukkend effect heeft op het rendement.

Lagere mobiliteitskosten stimuleren de mobiliteit van kapitaal. Dit leidt tot een lager niveau van sociale zekerheid in het kapitaal-importerende land en een hoger niveau in het kapitaal-exporterende land. In het eerste land is vanwege de toename van kapitaal en de toenemende werkgelegenheid de vraag naar sociale zekerheid verminderd. Voor het kapitaal-exporterende land geldt een soortgelijke redenering. Aangezien de zuidelijke lidstaten van de EU kapitaal-importerende landen zijn en het niveau van sociale zekerheid lager is dan in de noordelijke lidstaten, zou dit kunnen impliceren dat de divergentie tussen de sociale zekerheidsstelsels in de EU zal toenemen.

Vanwege het feit dat het kapitaal-exporterende land het niveau van sociale zekerheid verhoogt als gevolg van toenemende mobiliteit wordt de wenselijkheid van coördinatie voor het kapitaal-importerende land verminderd. De negatieve externe effecten van 'te lage' belastingen nemen af. Voor het kapitaal-exporterende land geldt een tegenovergestelde redenering. Dit betekent dat de kans op vrijwillige coördinatie van sociale zekerheid afneemt.

In de hoofdstukken 5 en 6 staat de relatie tussen handel en sociale zekerheid centraal. In beide hoofdstukken wordt het aanbod van goederen door de consumentenvraag bepaald en maximaliseren ondernemers hun winsten door middel van prijszetting. De goederenmarkten zijn niet volledig geïntegreerd door het bestaan van handelsbarrières. Deze barrières zijn exogeen in hoofdstuk 5, maar endogeen in het daaropvolgende

hoofdstuk. De belastingtarieven hebben een opwaarts effect op de loonkosten in beide modellen en daarmede op de prijzen van de goederen. Landen hebben enerzijds de neiging hun niveau van sociale zekerheid te verhogen - dit verbetert de ruilvoet en buitenlandse consumenten betalen door middel van de hogere prijzen nu een groter gedeelte van de sociale zekerheid in het andere land -, maar anderzijds de neiging dit niveau te verlagen, omdat dit het concurrentievermogen van de binnenlandse bedrijven bevordert en hun omzet. De resultante van deze twee externe effecten is niet altijd duidelijk. Het model in hoofdstuk 5 toont aan dat op korte termijn - als er geen vrije toe- en uittreding van bedrijven op de markt is - het eerste effect overheerst. Het niveau van sociale zekerheid is dan te hoog vergeleken met coördinatie. Als er vrije toe- en uittreding is, kan het niveau van sociale zekerheid te laag zijn. Dit wordt met name beïnvloed door de mate van substitueerbaarheid tussen binnenlandse en geïmporteerde goederen. Als deze substitutie voldoende groot is, zal de tweede externaliteit overheersen en het niveau van sociale zekerheid te laag zijn. Daarnaast wordt in dit model aangetoond dat een verlaging van de handelsbarrières op lange termijn een drukkend effect heeft op het niveau van sociale zekerheid. Dit wordt mede veroorzaakt door de toename van handel, produktie en werkgelegenheid.

Hoewel in het model in hoofdstuk 6 er geen vrije toe- en uittreding is, betekent dit niet dat een niet gecoördineerd sociaal zekerheidsbeleid tussen de landen tot een te hoog niveau van sociale zekerheid leidt. Dit wordt bepaald door het feit dat in het model in het vorige hoofdstuk de lonen geïndexeerd zijn terwijl dit niet het geval is in hoofdstuk 6. In dit hoofdstuk wordt het niveau van de handelsbarrières endogeen door de landen zelf bepaald. Centraal staat de vraag of meer samenwerking op het gebied van handel(sbarrières) leidt tot meer concurrentie op het gebied van sociale zekerheid tussen de landen. Hiervoor wordt het nieuwe begrip "de mate van belastingcompetitie" geïntroduceerd. Het hoofdstuk laat zien dat sociaal zekerheidsbeleid vaak gebruikt wordt als een imperfect substituut voor handelsbarrières die door internationale overeenkomsten als de GATT-afspraken en de voltooiing van de interne markt in de EU verboden zijn of beperkt worden.

Als de handelsbarrières hoog zijn en de goederenmarkten van beide landen slechts gedeeltelijk zijn geïntegreerd, leidt een niet gecoördineerd sociaal zekerheidsbeleid tot een te hoog niveau van sociale zekerheid vergeleken met een gecoördineerd beleid. Als de handelsbarrières verminderd worden, zal de mate van belastingcompetitie afnemen. Als de goederenmarkten echter verder geïntegreerd zijn leidt dit gebrek aan coördinatie ten aanzien van sociale zekerheid tot een te laag niveau en zal verdergaande integratie de mate van belastingcompetitie alleen doen toenemen. In dat geval worden de welvaartswinsten van samenwerking op het gebied van de handel gedeeltelijk te niet gedaan door meer beleidsconcurrentie op het terrein van de sociale zekerheid.

Hoofdstuk 7 behandelt de effecten van kapitaalmobiliteit in een dynamische context in plaats van de statische context in hoofdstuk 4. Economische groei is gemodelleerd volgens de principes van een endogeen-groeimodel waarin de produktie-externaliteit wordt opgeheven door investeringen door de overheid. Er is een bronbelasting op kapitaalinkomen (zeg vennootschapsbelasting) waaruit die overheidsinvesteringen en de uitkeringen aan werknemers betaald worden. Het overheidsbudget wordt dus voor consumptieve en investeringsdoeleinden aangewend. Kapitaaleigenaren investeren in beide landen. Uitgaande van de situatie dat de overheid voornamelijk de belangen van de werknemers behartigt zal de overheid meer investeren dan nodig is om maximale economische groei te bereiken. Dit wordt veroorzaakt door het feit dat werknemers deze investeringen niet behoeven te betalen en er wel profijt van hebben. Gebrek aan coördinatie op fiscaal terrein leidt er toe dat landen enerzijds geen rekening houden met de effecten op het kapitaal- en arbeidsinkomen in het buitenland (dit externe effect was ook in hoofdstuk 4 aanwezig). Daarnaast beïnvloeden belastingen de economische groei in het buitenland negatief omdat belastingen de toename van de besparingen in eigen land beperken en daarmede de investeringen in het buitenland. Naarmate een groter gedeelte van het kapitaal in het buitenland geïnvesteerd wordt en beleidsmakers de toekomst belangrijker vinden, zal het externe effect op de groei het tegenovergestelde effect op het kapitaal- en arbeidsinkomen domineren. Dit impliceert dat landen te veel besteden aan investeringen en uitkeringen. In dat geval is de economische groei in beide landen inefficiënt laag.

Een toename van kapitaalmobiliteit zal in dat geval een opwaartse druk hebben op de overheidsuitgaven. De mate van belastingcompetitie neemt dan toe. Dit is ook het geval als sociaal zekerheidsbeleid wel gecoördineerd wordt maar investeringspolitiek tussen de landen niet. Als er echter te weinig wordt uitgegeven door de overheid zal toenemende kapitaalmobiliteit een drukkend effect op de bestedingen hebben. Ook in dat geval neemt het inefficiënt gebruik van beide beleidsinstrumenten toe en daarmede de wenselijkheid van coördinatie.

Op basis van al deze resultaten worden in hoofdstuk 8 enige algemene conclusies getrokken. Ten aanzien van beleidsconcurrentie op het terrein van sociale zekerheid kan gesteld worden dat dit niet noodzakelijkerwijs leidt tot een te laag niveau van sociale zekerheid gezien van uit het perspectief van een economische unie, maar dat het niveau te hoog kan zijn met name als economische groei op lange termijn in de analyse betrokken wordt. Ten tweede kan gesteld worden dat verdergaande integratie waarschijnlijk leidt tot toenemende belastingcompetitie op het terrein van sociale zekerheid. Dit betekent dat coördinatie van sociale zekerheid op Europees niveau wenselijk is op lange termijn zelfs als dit niet noodzakelijkerwijs het niveau van sociale zekerheid beschermt.

Ten derde lijkt toenemende integratie een neerwaarts effect te hebben op het niveau van sociale zekerheid. Deze conclusie geldt echter niet als het niveau van sociale zekerheid inefficiënt hoog is, veroorzaakt door economische groei. Ten vierde, de effecten van toenemende integratie zijn niet hetzelfde voor alle lidstaten, maar afhankelijk van het saldo tussen immigratie en emigratie en de import en export van kapitaal en goederen. Ten slotte blijkt dat de welvaartswinsten van samenwerking op bepaalde beleidsterreinen gedeeltelijk teniet gedaan kunnen worden door meer beleidsconcurrentie op andere terreinen.

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This book considers the problems of national social insurance policies in an economic union. Using two-country models it identifies the external welfare effects of national social insurance policies that accrue to other countries due to the mobility of labour and capital, and trade in the union. It determines whether this leads to an inefficient high or low provision of social insurance compared to the case that countries take account of the external welfare effects. Furthermore, it examines the spillovers of coordinating policies in one area to other policy areas in which coordination does not take place. Moreover, it studies the effects of the increasing mobility of labour and capital, and trade on the level of social insurance and the desirability of coordinating these policies.

ISBN 90-5668-003-x

CentER Dissertation